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Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Peace—And Good Trade

THOUGH political questions usually fall outside the scope of THE CHEMICAL AGE, one cannot allow the momentous issue of the Irish negotiations to pass without an expression of thankfulness and relief at this new peace treaty between Great Britain and Ireland. The Irish problem has long been the despair of statesmen, and the violent form which Irish discontent has latterly assumed has contributed heavily to the general sense of unsettlement. The peace now provisionally agreed on is a great step towards the stability the country needs. Its effect upon commercial confidence, if not on trade itself, will be immediate, and robust commercial confidence is the first condition of trade development. One further step is needed to complete the good work. That is a treaty among the Powers represented at Washington guaranteeing the future peace of the world. The signs, happily, are favourable. The basis seems to be in sight of a policy for limiting unbridled rivalry in armaments on sea and land, and finally arresting the so-called naval and military preparations against war which are really the surest preparations for it. If to this great end can be added a decision to cancel war debts and to correct the present abnormal inequalities of exchange, the way will be clear for a general restoration of world trade, in which this country should play a predominant part. The year now nearing its close will long be remembered for the anxieties it has brought to business men. That we have got through so well is a proof of our commercial saneness and resource. With peace at home and abroad once more firmly established, the New Year should witness a welcome lightening of burdens and a steady and progressive movement towards the recovery of good times.

To-day's Decisions

TO-DAY (Saturday) Mr. Cyril Atkinson, the referee under Part I. of the Safeguarding of Industries Act, is to give his decision on the question whether santonine and also incandescent gas mantles are to be included in the Board of Trade's list of dutiable articles. His task is no easy one, for the reason pointed out last week that he lacks any commonly agreed definitions or guiding principles. Indeed, the hearings have rather increased than diminished the difficulty, and the fuller disclosure of the Board of Trade's conception of the Act vitally changes the position. The argument most commonly employed in support of the Act was one which, we believe, all reasonable people even now would accept. It was said that, in order to meet vital national needs during the war, patriotic firms had started new industries, at considerable expenditure of money and energy; that there was at least an implied promise that such industries should be guaranteed against unrestricted foreign competition for a period sufficiently long to give them a fair chance of becoming self-supporting; and that the Safeguarding Act was the necessary fulfilment of this pledge. To reassure the country that the measure was not sheer Protection under a new guise, its operation was limited to a period of five years. That, as we remember it, was the case put before the country, and it seemed fair and moderate.

But what is the case now openly stated by the Board of Trade? Not the temporary protection of particular young industries until they are fairly on their feet, but something vastly different and more comprehensive. The Board has suddenly become magnificently indifferent to details. It can only regard industries as a whole. And a fine chemical industry, it argues, must be established at all costs, not apparently because of its immediate usefulness, but because its plant and personnel might again become essential in case of war. The obvious and primary purpose of a fine chemical industry—that is, to supply ourselves with fine chemicals—thus becomes subordinate to the remoter purpose of supplying the country with a potential military plant and staff. To conceal

a military and political object of this character under the guise of safeguarding infant industries is hardly frank dealing with the public, and the Industries and Manufactures Department of the Board of Trade must have travelled far outside its own province to reach this advanced point in foreign politics. If it can only see industries as a whole and cannot condescend to details, it would be more logical to rely on the general terms of the schedule, which include "synthetic organic chemicals," and "all other fine chemicals." A commonly accepted definition of a fine chemical is all that would then be required, and if the Board could even now produce one, with the joint imprimatur, say, of the Chemical Society, the Institute of Chemistry, and the Society of Chemical Industry, its position might be secure. But instead of ignoring details of industry, what is its own list but a mass of details? And instead of supplying the referee with a definition backed by irresistible authority, what does it offer through its representatives more than some interesting chemical *obiter dicta* on the point?

The Board of Trade's policy of mixing up political and industrial objects may possibly end in a bad muddle, but it is important that the genuine new industries which the Act purports to safeguard should not suffer in consequence. We believe the country desires to keep faith with them, and to give them the fair chance of making good which was promised them. We cordially associate ourselves with the hope, expressed by a high authority elsewhere in this issue, that the manufacturers "will go right forward with their plans for the development of the fine chemical industry." While using to the full the temporary protection guaranteed by Parliament, they will be wise to remember all the time that the only permanent guarantee lies in intrinsic efficiency and not in meretricious aids.

Combined Recovery of Cyanogen and Carbon Bisulphide

In a recent issue of our contemporary *The Gas World*, Dr. Charles Carpenter—in the course of a review of Mr. Alwyne Meade's "Modern Gasworks Practice"—remarked that "the day is probably not far distant when the gas engineer will have learned to look upon cyanogen as a serious impurity." When a statement of this nature comes from so authentic a source it necessarily compels attention, particularly when one bears in mind that it was primarily Dr. Carpenter who conceived the idea and predicted the introduction of the now general principle of selling therms. The question of cyanide recovery on a large scale is one which might have some considerable influence in chemical circles generally; for, although the early stages of production are the concern of gasworks and coke-oven establishments, it is to the chemical works that the more elementary compounds will find their way for working up into the final commercial products. Probably attempts to recover the hydrocyanic acid present in the volatile constituents derived from coal would have been far more generally made were it not for the fact that universal recovery would almost surely be followed by severe disorganisation of the market for cyanide products. As is well known, the market for these products is a decidedly limited one—apart from processes involved in the recovery of gold there are only a few minor applications—so that wholesale recovery would lead to serious flooding of the market with a consequent fall in prices. Moreover, many producers would stand in danger of finding no market at all. For all that, it is important that gas undertakings should for their own protection find some solution to the *impasse*.

There are many who consider—and here, again, Dr. Carpenter is in the forefront—that the interests of the general public are best served by the elimination, or rather the reduction, of carbon bisulphide in coal gas. This matter is a particularly contentious one; but there is no question that were it possible to devise a simple process which, simultaneously, would effect the extraction of hydrocyanic acid and carbon bisulphide, there would be many who would be prepared to introduce it. The possibility of devising a dual process is brought to our mind by a recent French method (Patent No. 516,652) which claims to have solved the problem of extracting both impurities with the ultimate production of alkaline ferrocyanides. Subsidiary advantages claimed are the prolongation of the life of the oxide of iron used in the dry purifiers, and an increased yield of benzol where this is recovered as a spirit.

The process appears to be a refinement of the well-known polysulphide method which has been used with such success in this country, an additional raw material, sodium sulphide, being introduced. The gas, containing hydrocyanic acid and carbon bisulphide, is passed through a solution of sodium polysulphide, which becomes saturated with ammonia, and the hydrocyanic acid is converted into ammonium sulphocyanide in the ordinary manner. The weakness of the process, however, would seem to lie in the fact that reliance is placed upon reaction between ammonium sulphide and carbon bisulphide to form ammonium thiocarbonate—a theoretical proposition which unfortunately goes awry under practical conditions. Albeit, as an end product sodium sulphocyanide is obtained and, after drying and crushing, is mixed with powdered iron, the mixture being heated electrically to 450° C. A ferrocyanide is, accordingly, formed which may, if desired, be converted from the sodium to the potassium salt. The process is certainly not without interest, and we have referred to it as a type rather than to any special promise which it may show. It is, in fact, of a somewhat involved nature, whereas the present attitude towards hydrocyanic acid and carbon bisulphide in coal gas is such that, unless a simple straightforward method becomes available, manufacturers of gas will prefer to continue with their present policy.

The Chemical Industries of India

In Mr. T. M. Ainscough's general review of the conditions and prospects of British trade in India for the past two fiscal years, revised to October, 1921 (Department of Overseas Trade, pp. 362, 5s.), chemical manufacturers and merchants as well as research chemists will find much that immediately concerns them. This wide survey of the present and potential resources of the Indian Empire indicates the essential part that applied chemistry must play in India's industrial and commercial development. The recommendations published in 1920 of the Chemical Services Committee, presided over by Professor J. F. Thorpe, are probably already familiar to our readers. They cover an unusually wide field. The question of the desirability of creating an all-India Chemical Service is still under

consideration. The general trend of opinion in the provinces is adverse to the creation of further Imperial Indian Services, over which the local governments have no control, and this feeling is profoundly affecting the institution of both an Imperial Industrial Service and the all-India Chemical Service. Sir Thomas Holland, however, has decided views as to the great advantages likely to accrue from a strong centralised service, which would consider India's needs as a whole and so prevent overlapping and duplication of effort. The whole question is now being reconsidered by the provinces.

Already valuable scientific work is being done at the Indian Institute of Science, Bangalore. Chemistry is one of the two main branches of study, and the chemical departments are usually well-equipped for research on technical problems. The work includes the examination of raw materials and determination of their suitability for a given purpose, the improvement of existing processes, the investigation of processes new to India and of processes likely to prove of commercial value. As an example of the practical character of the research, it may be mentioned that the whole of the plant for the present factories which distil the bulk of the world's supply of sandalwood oil was based on the Institute's experimental work. Similar work was done to enable a thymol factory to be started, and a chemical factory is being designed for Bengal on lines indicated by experimental work at the Institute. At present the laboratories contain complete plant for the production of bichromates, white lead, sodium thiosulphate, hardened oils, aluminium and caffeine in quantities sufficiently large to afford data for commercial purposes, and an accelerated sludge plant for sewage research is shortly to be installed. The volume deals at length with the natural resources of India and the present condition of its chemical and allied industries. These matters it is proposed to notice more fully in a later issue.

Gas Mantles Inquiry

THE inquiry respecting the exclusion of incandescent gas mantles from the Board of Trade list of dutiable articles under the Safeguarding of Industries Act raises even more hair-splitting problems for lawyers than the santonine inquiry. If it is decided to include mantles as they come into the country, the question arises whether the whole mantle should be taxed or merely the thorium and cerium which give it its lighting value. The Customs rule is to charge, not on the whole article, but on the dutiable proportion of it, and a very nice calculation will be needed to fix the dividing line.

In this inquiry it may be noted that the gas companies are opposed to the inclusion of gas mantles, not only because an increase of price will tend to restrict the consumption of their gas for lighting purposes, but also on the familiar free-trade ground that the consumer—in this case the general public—will be worse off. The Act, however, seems definitely to rule out this general argument. It is obvious that one cannot tax cheap foreign goods without putting the price up to the home consumer; but on a balance of advantages Parliament obviously decided that the higher price to the British consumer was a lesser evil than the decline and extinction of British manufactures. That, at least, is the theory; experience alone will show how it works out.

Points from Our News Pages

In an article on the softening and de-oxygenation of boiler-feed water, the writer discusses the comparative merits of various water-softening systems (p. 726).

Decisions will be given to-day (Saturday) by Mr. Cyril Atkinson, K.C., on the appeals relating to santonine and gas mantles. The hearings were concluded some days since (pp. 732-3).

Expert opinions are published on the definition of a fine chemical (p. 729).

Mr. W. Cullen, at a meeting of the London Section of the Society of Chemical Industry, appealed for additional members for the Chemical Industry Club, which he characterised as the cheapest club in the West End (p. 731).

Dr. S. Pickles, in a paper on "Ingredients of Rubber Mixings," discusses vulcanising agents and accelerators (p. 730).

Definitions of the terms "chemical," "fine chemical," and "chemicals manufactured by fermentation processes" are published by the British Association of Chemists (p. 728).

Our Berlin correspondent reports a speech in which Dr. Duisberg refers to the effect on German chemical trade of the development of chemical industries in other countries, and to the Allies' attitude to the German dye industry as represented by Major Lefebure and others (p. 737).

Mr. Chaston Chapman, arguing that the next war will be largely a chemical war, states that our national existence may depend on the way in which chemistry is recognised and supported in the immediate future (p. 728).

The demand for chemicals is stated in our market report to have been fairly well maintained during the week. Generally speaking, prices are firm, with the tendency on the whole upwards (p. 743).

Books Received

PATENTS AND CHEMICAL RESEARCH. By H. E. Potts, M.Sc., Liverpool: University Press of Liverpool. Pp. 198. 8s. 6d. net.

THE PHYSICS AND CHEMISTRY OF COLLOIDS AND THEIR BEARING ON INDUSTRIAL QUESTIONS. Report of a General Joint Discussion held by the Faraday Society and the Physical Society in October, 1920. London: H.M Stationery Office. Pp.190. 2s. 6d. net.

The Calendar

DEC.		
13	Faraday Society: Annual General Meeting. "The Structure of Gaseous Molecules." Professor A. O. Rankine. 7.45 p.m.	Burlington House, Piccadilly, London.
13	Society of Chemical Industry (London Section) and the Chemical Industry Club: Films on "Winning and Working of Sulphur," "Manufacture of Steel," "The Metallurgy of Zinc." 8 p.m.	Institution of Mechanical Engineers, Storey's Gate, London.
14	Society of Chemical Industry (Manchester) Hot Pot Supper.	Manchester College of Technology.
14	Society of Glass Technology: Papers by Verney Stoll, A. J. Dalladay and F. Twyman. 2.45 p.m.	University College, London, W.C. 1.
14	West Cumberland Association of Chemists, Chemical and Metallurgical Engineers. "Steel Ingots." G. J. Valentine.	Technical College, Workington.
15	Chemical Society: Ordinary Scientific Meeting. 8 p.m.	Burlington House, London.
19	Chemical Industry Club: "The Making of a Mirror," Dr. W. R. Ormandy. 8 p.m.	2, Whitehall Court, London.

Softening and De-oxygenation of Boiler Feed Water

The writer discusses the comparative merits of various water-softening systems, dealing with costs and relative efficiency. Emphasis is laid on the importance of effecting oxygen removal, and both chemical and physical methods for performing de-oxygenation are discussed.

THE evaporation of an untreated supply water in a steam boiler causes the accumulation of dissolved salts and the deposition of a " scale " upon the interior of the boiler shell. Many of the salts, for instance, magnesium chloride, sodium chloride, &c., have pronounced corrosive actions upon the iron plates and brass internal fittings of the boiler, whilst other salts, of less corrosive action, are likely to cause priming and foaming troubles in the operation of steam raising. The process of eliminating dissolved salts is termed water " softening," and both temporary and permanent hardness is usually removed.

Variants of two main processes are possible in practice, in which the salts are removed by chemical precipitation, and by " base exchange," respectively. In the latter method the calcium and magnesium oxides of the dissolved calcium and magnesium salts, are exchanged for sodium oxide by filtration over a natural or artificial zeolite, so that soluble sodium salts, with no scale-forming propensities, are left in the treated water. It should be noted in passing, that in many small installations the so-called " boiler compounds " are employed. These compounds are added to the feed water, and in many cases effectively prevent scale formation, Many fraudulent materials have been placed upon the market, and as, in addition, the exact physical and chemical action of many of the genuine articles is not quite clear, the use of boiler compounds will not be discussed here. It may be noted, however, that mineral oils, graphite, &c., have been suggested for causing a non-adherent slime to be produced in the boiler in place of the ordinary " scale " ; alkaline compounds have been used for preventing corrosion and assisting insoluble salt removal easily ; zinc powder has been suggested as a preventive of " electrolytic " corrosion, and so on.

Precipitation Methods of Softening

The scale-forming salts which are present in raw water are capable of reaction with various chemicals, whereby water-insoluble compounds are formed which can be removed before the water is passed into the boiler. Thus, the bicarbonates of calcium and magnesium may react with lime or sodium carbonate, so that temporary hardness may easily be removed, whilst substances such as calcium sulphate and the like, causing permanent hardness, may be precipitated in the form of insoluble salts, by means of sodium carbonate. When an alkaline carbonate is employed, soluble sodium salts, &c., remain in the feed water, but unless a great excess of these is present, no untoward result need be feared when the water comes to be evaporated in the boiler.

There are several processes available, in which sodium carbonate, a mixture of sodium carbonate and caustic lime, a mixture of lime and barium carbonate, &c., may be employed, but the so-called " lime-soda " process is that most widely applied. The analysis of the feed water having been effected, it is easy to calculate the necessary amounts of precipitation agents necessary, and these may be added continuously from a proportioning device, or intermittently to definite amounts of crude water. After reaction, the precipitated salts are allowed to settle, and the treated water is drawn off through filters.

The experiments of Herrle and Gleeson (*Chem. Met. Eng.*, 1920, 261) will serve to exemplify the part played by the lime and soda ash respectively. By the addition of lime alone to a raw water, it was found that, as the amount of lime added was gradually increased, the hardness of the water decreased until reaction between lime and the salts causing temporary hardness was complete. Thus, lime re-acts with calcium bicarbonate, $CaO + Ca(HCO_3)_2 = 2CaCO_3 + H_2O$.

On addition of further quantities of lime, however, no further reduction in hardness was effected, but on the contrary, excess of lime became a cause of increased hardness and alkalinity. Similarly, on the addition of gradually increasing quantities of soda ash, the salts responsible for permanent hardness were re-acted upon, as, for instance, in the following manner with calcium sulphate,

$$CaSO_4 + Na_2CO_3 = Na_2SO_4 + CaCO_3.$$

After the theoretical addition of carbonate, however, further quantities caused no increased hardness. It is therefore recommended that a slight excess of soda ash be added to raw water in practice, as complete softening will result, with only slight increase in alkalinity.

This recommendation has been hotly contested, and it has been stated that excess of soda ash will lead to foaming and priming troubles in the boiler. On the other hand, a small excess can do little harm in this connexion, and with careful attention to the boiler good results can be obtained with a slight excess of ash, or with slightly insufficient ash.

" Hot Process " Softening

Upon the question of carrying out the precipitation reactions in hot solutions, however, there can be no two opinions, provided, of course, that the thermal balance of the softening reaction be watched. Gibson (*Chem. Met. Eng.*, 1920, 899) states that the rate of reaction is so greatly increased by operation at boiling temperature that the water is softened as completely in ten minutes at this temperature as in a day at ordinary temperatures. Moreover, the settlement of the precipitated carbonates is increased in speed. Settlement depends, *inter alia*, upon the viscosity of the water relative to the precipitated particles, and upon the size of the particles. In continuous softening apparatus, the speed of filtration may be increased considerably if hot process softening be adopted.

Natural or artificial zeolites consisting of double silicates of aluminium and an alkali metal have the property of base exchange. If a raw water containing calcium and magnesium salts in solution be passed over the zeolite at an appropriate rate, double decomposition ensues and a calcium (or magnesium) and aluminium double silicate is formed, whilst the alkali previously present as a component of the zeolite passes into solution with the acid radical present in the raw water in combination with the calcium or magnesium. The reaction is purely one of mass action and is reversible, thus :

$$Na_2O(Z) + CaSO_4 \leftrightarrows CaO(Z) + Na_2SO_4. \quad Z = \text{Zeolite.}$$

As the formation of the calcium zeolite proceeds, however, equilibrium is approached, and the water passes the zeolite with a few degrees of hardness, or, in other words, some calcium misses reaction. At this stage, the water flow is arrested, and replaced with a strong solution of brine and the reaction

$$CaO(Z) + 2NaCl \leftrightarrows Na_2O(Z) + CaCl_2$$

proceeds almost entirely from left to right, by reason of the relatively high concentration of the sodium salt. The zeolite mass is thus regenerated, and is capable of reacting as in the first equation, and so effecting only the softening of further quantities of raw water. This cycle may proceed regularly *ad infinitum*.

In practice, the zeolite is contained in suitable tubes, the raw water is passed at approximately 10 metres per hour linear velocity, and the regeneration effected at suitable intervals, say, of eight or twelve hours. An exchange of about 1 or 2 per cent. is possible reckoned as CaO on the weight of zeolite—and regeneration requires up to 10 per cent. of salt, on the weight of zeolite.

Perhaps the best known of the artificial zeolites is that sold under the name of " Permutit," which may be prepared by fusion of appropriate quantities of the silicates composing

it, or by double precipitation between sodium silicate and aluminate, under certain specified conditions.

A recently patented material of the same nature and properties, but containing no aluminium, consists of granules of a sodium silicate, which, however, contain much less sodium than the ordinary " neutral " silicate of commerce.

Comparative Costs and Efficiencies

The supporters of zeolite and precipitation methods of water softening can find advantages for each method. The precipitation system finds great favour, however, by reason of its relative cheapness. Thus, considering the softening of a Seine water mentioned by Paris by means of the lime-soda method, for the treatment of a ton of the raw water, about 1.25 lb. of lime and 0.18 lb. of soda ash are required. If, on the other hand, the water were softened by the zeolite method, obtaining over 1 per cent. exchange, 10 lb. of sodium chloride would be required for regeneration of the zeolite. Hence, taking the round figures of 50s., 50s., and 200s. respectively for the prices of lime salt and soda ash, the costs in chemicals per thousand gallons of water treated would be 0.34d. and 0.21d. for the lime-soda process, and 2.7d. for the salt used in the zeolite regeneration. That is to say, the zeolite method is at least five times as costly in chemicals as the lime-soda process.

In addition, the capital costs and depreciation of a zeolite softening installation are higher than in the case of a precipitation system, and although the zeolite mass is practically insoluble in water, in the course of time some replacement is necessary.

The zeolite method, however, will allow of fluctuations in the hardness of the water, whereas a sudden change in hardness of water supplied to a precipitation softener will cause trouble unless careful attention is being paid to the plant continuously. At the same time, the capacity of the zeolite bed is more or less fixed, and the installation cannot be " pushed " as can the precipitation system, in case of need.

The zeolite softening plant is more compact and easier to work and superintend than the precipitation installation. Little can go awry with the zeolite softening process, but it must also be admitted that there is little fear that mistakes may occur in the operation of the precipitation plant, in the hands of the average workman.

One marked advantage of the zeolite method still remains, however, and this is the reduction of the hardness of the treated water to almost zero hardness. On account of the appreciable solubility of calcium carbonate in water, the water from a precipitation lime-soda softening plant cannot be brought to this high degree of softness, and from 2 to 3 grains per gallon of hardness are usually the tests of the treated water. This means that more scale-forming substances pass to the boiler when precipitation water softening has been employed. Where water is to be used in textile operations, scouring, dyeing, &c., the removal of calcium salts, &c., as completely as possible is a great advantage. The calcium soaps formed when water containing calcium salts is used in washing operations, are tenacious and sticky, and cause manifest difficulties in the subsequent mechanical operations. In addition, the loss of sodium or potassium soap is considerable. For every grain of calcium oxide left in the water, about ten grains of soap are wasted in the form of insoluble, deleterious calcium soap. Thus, even if the zeolite softener costs 2d. more per thousand gallons in chemicals for softening this is recouped many times if a difference of 2 grains calcium oxide hardness per gallon is attained. A saving of several pounds of soap per thousand gallons of water used may easily result.

In boiler practice, however, this may not be so important, although the ideal of perfect continuity of running may be the more nearly approached, the less calcium salts are sent to the boiler. On the other hand, the zeolite method of softening necessitates the presence of more soluble salts of sodium in the treated water than in the raw water. Priming and foaming of the water are the more likely to occur, especially if a very hard water has been treated and relatively large quantities of soluble salts are left in the treated water, following base exchange.

In the softening of water for boilers, the adoption of an efficient precipitation method of softening is preferable and less costly, on the whole, although the claims of the zeolite method, notably in specific and special cases, must not be overlooked.

The Corrosion of Boiler Plates

Corrosion of boiler plates is fundamentally due to the presence of oxygen in the feed water, in all but few exceptional cases. It is true that, from time to time, cases are reported where corrosion is stated to have been traced directly to the presence of excessive quantities of carbon dioxide in the feed water, but ordinarily the influence of dissolved oxygen is the more responsible for corrosion, although carbon dioxide acts as accelerator. Oxygen is taken up from the air together with other gases, but on account of its higher solubility, the ratio of oxygen to nitrogen in water is about twice that of oxygen to nitrogen in air, although the ratio of partial pressures is nitrogen : oxygen : : 4 : 1. At ordinary temperatures, water dissolves 7 c.c. per litre of oxygen, and although this is reduced to about 2 c.c. at 100°, a state of false equilibrium arises and it is only by prolonged boiling, preferably under vacuum, that an approximate complete removal of oxygen can be effected. When it is realised that there is enough oxygen ordinarily present in boiler feed water to react—theoretically—upon 6 lb. of iron per day (in the running of an ordinary Lancashire boiler), the necessity of oxygen removal is graphically illustrated.

Before passing to a consideration of the methods by which oxygen removal can be accomplished, it may be well to indicate the general modern agreement upon the question of the supreme importance of the effect of oxygen. Other influences contribute towards corrosion, but oxygen must be considered the prime factor in the majority of cases.

Richardson, who has studied the question of corrosion very exhaustively and has reported in many papers to the American journals, maintains that oxygen is the chief factor in causing corrosion. Electrolytic action plays a relatively small part, and such is the case with many other contributory factors.

Speller quite recently (*Chem. Met. Eng.*, 1921, 1009) has summarised the question, and states that corrosion is directly proportional to the oxygen content of water, and to temperature. Thus, whilst iron vessels operating at temperatures below 180°F. resist the action of water containing 0.4 c.c. oxygen per litre, steam boilers must be supplied with water containing less than 0.2 c.c. oxygen per litre. The influence of the composition of the iron—the quantity of carbon, sulphur, phosphorus, silica, manganese, &c.—is not large in proportion, although as will be noted later, various alloys and special irons have the power of resisting oxidative corrosion to a large degree.

De-oxygenation of Feed Water

Physical or chemical methods may be employed for the removal of oxygen from water.

It has already been noted that water at 100°C. still contains about 2 c.c. oxygen per litre. It is only by prolonged boiling that this can be reduced. In the methods for accomplishing this physically, agitation, raised temperature and reduced pressures are employed. The state of false equilibrium is destroyed, and the temperature and low pressure help the elimination of dissolved gases. Many variants of a general type of apparatus are known. Elliott, for instance, in British Patent No. 155,864, proposes to pass a jet of preheated water into a vacuous chamber. The drops of water boil with explosive violence, and steam and previously dissolved oxygen pass off. The steam is condensed and in the process preheats the incoming feed water.

The well-known apparatus of Weir (Glasgow) effects the projection of innumerable fine jets of water into an atmosphere

of steam. The water drops condense the steam, causing a partial vacuum, and become themselves heated. The conditions of mechanical shock, raised temperature and reduced pressure are thus combined in a simple way, and de-oxygenation is fairly complete.

Chemical combination of the oxygen contained in water with a suitable material has been attempted for many years and the passage of feed water over iron turnings under various conditions has been attempted. Definite satisfaction has not been the general rule, however, and the process is by no means in common use.

The rate of removal of oxygen from water passing over iron turnings is obviously dependent upon numerous factors, amongst which may be noted the amount of surface exposed, the speed of passage, the temperature, the nature of the iron—iron containing manganese is much more readily oxidised than ordinary iron—the prevention of the accumulation of a layer of iron oxide on the reactive surface of the turnings, &c.

Kestner has developed a process in which continuous de-oxygenation can be practised. A special manganese-iron alloy, easily oxidised, is contained in suitable cylinders, through which water can be passed in either direction. Filters are arranged to remove suspended matter—iron oxide and hydroxide—from water flowing in either direction. The water is passed upwards at suitable speeds for a day, and complete oxygen removal is effected, the amount of iron being calculated so that reaction is complete in the lower half of the column of turnings. The water flow is reversed for the next day's treatment, whereupon the upper half of the iron turnings functions. In the period of rest, however, the lower half of the turnings, being in a non-oxidising medium, regenerates itself somewhat since it has been shown that, in such conditions, the ferric oxide and hydroxide produced in the previous day's de-oxygenation of water, interact with the iron present, forming the lower hydroxides of iron which themselves can react with oxygen on resuming the upward flow of water on the following day. The process is thus continuous in removal of oxygen. Moreover, fresh surfaces of iron turnings are continually exposed to the oxygen-containing water, as the ferrous hydroxide produced during the " rest " periods is easily removed by the water current.

Safeguarding of Industries Act

To the Editor of THE CHEMICAL AGE.

SIR,—The attention being given in the commercial and technical press to the interpretation of the chemical terms employed in the Safeguarding of Industries Act will be welcomed by scientific men who are interested in a competent administration of this Act, in so far as it applies to chemical products. Before you apply a term or description you must know what that term or description means. The attempt has been made to administer the Act without any such preliminary and essential definition of its chemical terms, and the natural consequences have followed.

It is the opinion of my Association that it is incumbent on scientific men engaged in industry, by a mutual interchange of opinion, to arrive at an interpretation of the governing terms of the Act (so far as they apply to chemicals) such as shall have the common acceptance of those entitled to judge. As a contribution to such a consensus, I am instructed by my Council to forward you for publication a preliminary report of a committee of this Association which has been charged with the consideration of this aspect of the Act.

I would simply add that my Association is not concerned with the political aspects of the Act, but solely as a body of scientific men with their obvious duty of assisting the Government to render workable, so far as practicable, an Act of Parliament already in force.—Yours, &c.,

December 5. S. REGINALD PRICE,
General Secretary, British Association of Chemists.

[ENCLOSURE.]

The governing phrases employed in this Act—" chemical," " fine chemical," and " chemicals manufactured by fermentation processes," are not for the present purpose interpretable in purely scientific terms. The contents and avowed objects of the Act must, and accepted commercial usage should, be taken into consideration. Your committee have done so in framing this report.

Repeal or emendation of the Act is not a present issue. What is immediately necessary is to secure the expression of a considered opinion by chemists with commercial experience, reconciling the views of those producing and those consuming " chemicals " as an authoritative guide to the administration of the Act.

Your committee submit the following suggested interpretations :—

" Chemical."—A manufactured article, not being a food or drink, whose commercial value is not mainly dependent on its form.

" Fine Chemical."—A chemical of restricted use, prepared especially for that use.

" Chemicals Manufactured by Fermentation Processes."—A chemical is deemed to be manufactured by " fermentation process " when the main object of the fermentation is to produce that chemical.

Purity in itself is not necessarily a criterion of " fineness " of a chemical. The third definition would exclude tartaric acid from classification as a fermentation product, leaving open for decision its title to inclusion as a " fine chemical." These interpretations, whilst they have been very carefully considered by your committee, are put forward provisionally to furnish a basis for discussion, in order, by such interchange of opinion, to establish formulæ that shall command general acceptance. With this end in view, your committee recommend that this report should be made public, and that criticism and suggestions should be invited from those qualified to judge.

Importance of the Chemical Industry

Chemistry and Material Wealth

THE value of chemistry as a national factor in times of peace and war was emphasised on December 3 at a dinner given under the auspices of the Liverpool Sections of the Institute of Chemistry and the Society of Chemical Industry at the Exchange Station Hotel, Liverpool, Dr. G. C. Clayton presiding.

Vice-Chancellor Adami said that they intended to have at the University chemical laboratories dealing specially with the industries of Liverpool and district. In addition to teaching the principles of chemistry, the University had also to teach the application of those principles to every-day life.

Mr. A. Chaston Chapman, after referring to the membership roll of the Institute of Chemistry, said there was scarcely an industry which was not based on the results of chemical investigation. Without the chemist many industries would never have existed, and without him they could not be carried on successfully for a single day. Chemistry was perhaps the most potent of all factors in the creation of material wealth, and in our present condition of national exhaustion it was infinitely more important to devote our attention to the creation of new wealth than to squabble over the distribution of that which the war had left to us. To this end the encouragement of chemistry and the fullest utilisation of our chemists was a matter of the most urgent national importance. Touching on the value of chemistry in time of war, the speaker recalled Cromwell's admonition : " Trust in God and keep your powder dry." He would like to paraphrase this and say : " Trust in the League of Nations and keep your chemists active." There could be little doubt that the next war would be largely a chemical war. Our national existence, in fact, might depend upon the way in which chemistry was recognised and supported during the years immediately ahead of us.

Mr. Max Muspratt said the members of the chemical industry must be self-reliant ; they should also realise their importance to the world—an importance that could not be exaggerated. They must realise that they were working for mankind, and to get the best results from their work they must take the broadest view of every field of thought. They must dominate the nation, because they knew that they had the attributes, with the right amount of industry, with the right amount of general knowledge, to guide the country in the right direction, and to keep the nation and the Empire at the head of the nations and empires of the world.

An enjoyable musical programme was sustained by Mrs. Baly, Mrs. Hanley, Messrs. F. W. Hughes, A. Kennedy, J. Hanley, and R. Lloyd Moore.

The Definition of a Fine Chemical

A Collective Opinion on the Question

THE question, " What is a fine chemical ? " has excited a certain amount of levity, but it has its serious sides for the chemist and for those engaged in the production of fine chemicals. The following statement on the subject, though given in the singular personal form, may be taken to represent the collective judgment of chemical authorities of high standing and large experience, who have been consulted.

Our inquiry, " What is the chemist's answer to the question, ' What is a fine chemical ? ' " seemed to give no trouble to the experts. " The answer," we were told, " is clear enough in most cases, but is bound to present points of difficulty here and there. Boric acid, cream of tartar, zinc oxide, barium peroxide—these may be difficult cases. No such difficulty arises in the case of santonine, which, according to every usage of the term, is an undoubted and, in fact, a typical fine chemical. Santonine is a pure and definite chemical substance, crystalline in form, and with a definite melting point. To say that a pure definite chemical substance is not a chemical is to make a statement which would be laughed out of court before any jury of chemists. Once you grant that it is a chemical, it is obvious that it is a fine chemical. To urge that santonine is not a chemical because it is a natural extracted product and not artificially prepared by chemical reactions in a laboratory is a novel and tactical move on one side which may have paralysed the other side by surprise ; but surely such paralysis can only be momentary. Given a very short breathing space, sanity must return, and such a grotesque idea must be laughed out of court.

What the Act Says

" One argument alone," our informant continued, " should suffice to dispel any illusion on the subject even from an entirely non-chemical or legal mind, and that is in the schedule to the Act itself. What does it say ? ' Synthetic organic chemicals . . . all other fine chemicals (except sulphate of quinine of vegetable origin).' Note, first, that fine chemicals need not be synthetic ; that is, they need not be artificially produced by chemical reaction in the laboratory, but may be extracted fine chemicals, that is, synthesised by nature. Note, too, that sulphate of quinine of vegetable origin is expressly excepted ; therefore natural products of vegetable origin *are* included in the term " fine chemicals " ; therefore santonine is included.

" The purpose of the Act is to safeguard the fine chemical industry as a whole, not the industry of the manufacture of santonine, or that of any other fine chemical individually. Actually, it may be urged that the safeguarding is more indicated in the case of a substance which is not manufactured in this country than in one of which the manufacture is already established. The fact that santonine is not made in this country is, therefore, no argument whatever in favour of exempting if from the operation of the Act, but rather the reverse. The statements which are made so glibly that there is no likelihood at all of its ever being made in this country are simply untrue, and give rise to the suspicion that the wish is father to the thought on the part of persons who promote such misleading statements.

" The idea, again, that an article must be ' reactive ' in order to be a fine chemical is easily disposed of. Argon is a chemical element, and presumably no one will argue that it is not a chemical ; yet its most notable property, to which indeed it owes its name, is that it declines to react.

What an Adverse Decision Would Mean

" It is interesting," our informant proceeded, " to speculate on the consequences that might follow a decision that santonine is not a fine chemical. It has been humorously suggested that it is to be regarded as a vegetable in contradistinction to a fine chemical, just as rock salt is a mineral. It is indeed amusing, but a case where comedy and tragedy become indistinguishable.

" The object of the Act was to deliver the British Empire from dependence upon other nations for essential requirements. Santonine is a medicinal chemical, and one which is frequently required for medical treatment of natives, so that its use is widespread, and most of it is used within the British Empire. A skilful alliance of German and Russian interests succeeded in the year 1909 in securing such a control over this particular manufacture as enabled them very quickly to raise the price from 9s. to 100s. per lb., and thus to levy a very heavy tax upon the British Empire. To safeguard ourselves against such impositions, it is only necessary that we show a determination to do so, and to place confidence in the manufacturers who met our every need during the war. The raw material for the manufacture of santonine can be collected from within the Empire, and the monopoly, the result of which has been to raise the price of santonine from 9s. to 726s. per lb., which is the price to-day, can be broken, and the price reduced to a reasonable level. If santonine is not a fine chemical, we can only suppose that every crystalline substance produced from natural sources, whether animal, vegetable, or mineral, will ultimately be shown not to be a fine chemical.

The Position of British Manufacturers

" English fine chemical manufacturers will think that some evil genius is thwarting their efforts to render the country independent, if, following the Sankey judgment of two years ago, they are now to be told that the substances which they, in common with all chemists, have believed to be chemicals have received the wrong birth certificate, and that crystalline santonine is not a chemical. They must expect to wake up to-morrow to learn that common salt is not a chemical ; that the chief chemicals are lycopodium, beetle-powder, kieselguhr, and sand. Such is the crooked path along which we are led by ruling classes whose education in science is what it is.

" During the war patriotic and unpatrotic alike were murmuring ' never more.' Never more were we to become dependent upon an unscrupulous foreigner for supplies of essential chemical substances. The manufacturer of medicinal chemicals was told, if only he would set about making this, that, and the other substance of which we were in dire need, every care would be taken to see that his industry was safeguarded. He laboured day and night in the firm belief that the work he was doing would be of lasting value to his country. The Sankey judgment gave him a sudden and unexpected cold douche. Parliament then came along with the Safeguarding of Industries Act and told him to go ahead with his job. No sooner had he started on this than came the outcry by the dealers, who saw that the golden harvest which they were reaping by taking advantage of the adverse exchange to sell German chemicals in this country was coming to an end ; and the outcry of the disappointed men of science, who found that the addition of the duty was going to make their chemicals and apparatus cost them nearly as much as they did before the war, instead of being much cheaper as they had hoped. They shake their fists at the manufacturer, and in effect tell him : ' You dare to go on with your capital expenditure ! We are going to make this Act an absurdity.' It is to be hoped that manufacturers will take no heed of such threats, but will go right forward with their plans for the development of the fine chemical industry."

Institution of Rubber Industry

Second Manchester Meeting

THE Second Manchester Meeting of the Institution of Rubber Industry was held at the Midland Hotel, on Monday, Mr. Hugo W. Hatton presiding.

In a paper entitled "Ingredients of Rubber Mixings," Dr. S. S. Pickles said he would only be able to discuss the subject of rubber mixings from a general point of view. In making a survey of the ingredients of rubber mixings it was helpful to adopt some convenient classification into groups, though it must be borne in mind there was often no clear dividing line. The scheme of grouping adopted in the present paper was: (1) raw rubber; (2) vulcanising agents; (3) accelerators; (4) fillers; (5) rubber substitutes and reclaims; (6) softeners and plasticisers; and (7) pigments.

Dr. Pickles then dealt with each group in detail. The differences in grade between the rubber products collected from the various known *genera* of trees or plants were probably due to resins and protein matters, but it was not certain that the rubber molecule was the same in all cases. For the purpose of the paper he intended to confine himself to the consideration of Para rubber. It had been found that as regards tensile strength the best samples of plantation rubber were not inferior to the best samples of fine hard Para. There were other properties with regard to which it was not so easy to get results in terms of standard units, such as the suitability of solutions for adhesive purposes, but there was much evidence of the strong superiority of wild Para in that direction, and it was also the most satisfactory variety to use where there was possibility of "fatigue" and extension.

Tests for Curing Speed

There were several things to be considered when speaking of uniformity, *i.e.* (1) speed of cure, (2) behaviour on working, and (3) the speed with which over-curing defects became apparent. Anyone who had consistently tested fine hard Para during recent years for curing speed knew that there was a certain amount of variation. If they took the amount of sulphur combined after definite heating, or if they took the tensile strength and elongation as their criterion, the variation was such as to require the adjustment of the mixture or of the curing time. Moreover, there was a constancy in proportion between the time of cure and a rubber and sulphur test mix and a litharge mix. If they compared the fine hard Para and sulphur mix there was a constant relationship between one sample and another, as compared with the sample when it came to be used in the works along with mixes containing litharge. The rate of cure would not be the same, but there would be a certain constancy of ratio between the two. There was considerable variation in the times of curing of different consignments of plantation rubber, while in the case of brown grades the variation was most marked. Many plantation rubbers would stand an over-cure, while others were quickly susceptible.

Vulcanising Agents and Accelerators

Dr. Pickles then dealt with vulcanising agents, and passed on to the consideration of accelerators and their mode of action. For the sake of providing a rough working definition, he would describe accelerators as substances which speed up the combination of rubber with sulphur. Organic accelerators were basic in their character, and might be expected to form sulphides, oxy-sulphides, and para-sulphides, passing with sulphur, in nascent form, to the rubber. The activity of litharge varied considerably with different rubbers, even at the same temperatures and with the same amount of sulphur present; vulcanisation, even with litharge present, was often a slow process. If two plantation rubbers, one containing 3 per cent. of resin and the other less than 2 per cent. were taken, the two might cure at the same speed in a rubber-sulphur mix, yet when cured in a litharge mix the former would probably cure twice as fast as the latter. Litharge was not what might be called a permanent catalyst. Its activity was of comparatively short duration. In the case of lime there was probably a different type of reaction from that of litharge, the catalytic action not being so marked.

Some ten years ago, said the lecturer, the synthetic production of rubber began to look something like a business proposition. A certain amount was produced at considerable expense, but great difficulty was experienced in getting it to vulcanise properly. The importance of the presence of the non-rubber portion occurring in the natural product was then realised. Various materials were tried, and it was eventually found that synthetic rubber would combine in the presence of certain bodies containing matter of a nitrogenous character. The first patent was taken out in 1912, and the time of curing was stated to be reduced from one hour to fifteen minutes. Since 1912 there had been scores, if not hundreds, of organic compounds proposed for use as accelerators. They were almost all nitrogen containing bodies of a more or less basic character, and their activity, or effect in increasing the speed of curing, varied considerably.

A discussion followed, in which Messrs. Swallow, Leon, Harrison, and others took part.

Industrial Uses of Fuel Oil

Auxiliary Oil Firing-Installations

AT a meeting of the Royal Scottish Society of Arts, held in Edinburgh last week, Professor Stanfield presiding, Mr. A. F. Baillie read a paper on the "Importance of Fuel Oil." The lecturer said that fuel oil was often spoken of as "crude oil," but that was not correct, because crude petroleum oil as it issued from the well contained certain light fractions of gasoline and kerosene, which it was not only desirable to extract from the crude by distillation on account of their higher values, but which, if left in the crude oil and used as fuel, would be a wasteful procedure, and, further, would lower the flash point. That flash point had been very properly fixed for fuel oil by the British authorities, viz., *Lloyd's Register of Shipping*, 150°F.; London County Council, 150°F.; and the Admiralty, 175°F. Mr. Baillie described the air, steam, and pressure jet systems of oil fuel burners and said that for comparative purposes, and assuming each of these systems tested under a steam boiler, they would obtain a thermal efficiency of approximately 78 per cent. for the steam-jet system, 80 per cent. for the air-jet system, and 85 per cent. for the pressure-jet system.

Dealing with the use of oil fuel in factories, the lecturer referred to a Yorkshire factory in which the Lancashire boiler was fitted with auxiliary oil-burning apparatus. When using coal only there was a period of one and a half hours in the morning, and again in the afternoon, when the demand for steam for heating water was so great that the driving engine was starved of steam and its output was reduced accordingly. To overcome this difficulty auxiliary oil burners were fitted, and when the extra load came on the burners were put in operation. A steady head of steam resulted, thus ensuring output to the full capacity of the plant. Mr. Baillie also described auxiliary oil-firing in glass-works and in steel melting. Dealing in detail with the latter, he described the results obtained in heating open-hearth Siemens-Martin furnaces.

Directory of the Chemical Industries

Kelly's Issue 1921 Edition

IN view of the many changes in the chemical and allied industries within the last two years, the Fifteenth (1921) Edition of Kelly's Directory of the Chemical Industries, which has just been published at 30s. net, will be received with a considerable amount of interest. The work of revision must necessarily have been heavy, although the previous edition was published so recently as 1919; but when it is compared with the firm's monumental Directory of Merchants, Manufacturers, and Shippers of the World, it is apparent that their resources have not been unduly strained in the revision of the present volume.

It includes very complete lists of pharmaceutical chemists, drug stores, chemical manufacturers and merchants, wholesale druggists, drysalters, and kindred trades in England, Scotland, and Wales, and the principal towns in Ireland, the Channel Islands, and the Isle of Man. The main portion of the Directory comprises 858 pages as against 844 in the 1919 edition, but the present volume is actually thinner than the previous one owing to the use in the latter of better and thinner paper. Names are classified both under towns and trades as formerly. There is also a new section at the end giving a list of proprietary brands and articles, which should add materially to the usefulness of this indispensable reference book.

The Directory is obtainable from Kelly's Directories, Ltd., 186, Strand, London, W.C. 2, or from their branch offices in Birmingham, Glasgow, Leeds, Liverpool, Manchester, and Sheffield.

Society of Chemical Industry

London Section

THE London Section of the Society of Chemical Industry held a meeting in the rooms of the Chemical Society on Monday, Mr. E. V. Evans, presiding. Two papers were read, but between the reading of them Mr. Cullen made a few remarks with regard to the Chemical Industry Club. He said the club had been running for a few years, and the membership was now about 700. The position to-day was that the revenue was just balancing the expenditure, and it was believed that a great deal more could be done for chemists as a whole, and especially for the younger members, if they would all join the club. If they could get the membership to approximately 1,000, a great deal more could be done than was being done to-day, and, incidentally, they could make the club even more comfortable than it was at present. The subscription was three guineas for London members, two guineas for country members, and one guinea for foreign members, It was certainly the cheapest club in the West End.

Grading of Chemical Glassware

Mr. W. L. Baillie submitted a paper on "An Autoclave Test for the Grading of Chemical Glassware." This consisted very largely of an explanation of a large number of tables giving figures of results which have been obtained by a test devised by the author. The author laid down the requirements of an autoclave test as being expeditious and simple in manipulation, capable of completion in the working day, robust and readily available and capable of having the pressure varied so as readily to detect mediocre glasses and at the same time made so that more resistant glasses will not readily break down under it. In this connexion, tests have been carried out at varying pressures for varying periods, but for general purposes a pressure of 6 atmospheres for three hours had been found to be a suitable one. Figures were given, however, of many tests under different conditions. The author claimed that his autoclave test fulfilled the practical requirements laid down, and among the conclusions which he had drawn from the tests made were that there was a close correlation between durability and alkalinity and that an alteration in the weight of the glass and the amount of residue after evaporation was of less importance. The tests, which were all made on British glass, showed that there were British glasses which possessed excellent lamp-working properties, indeed, the author claimed that the worst of the glasses he had used were superior to the best that came into this country from abroad as lamp-working glasses.

Separation of Oil from Rock

In a paper on the "Separation of Adherent Oil or Bitumen from Rock," Dr. E. Fyleman said that in various parts of the world there existed large aggregates of more or less finely-divided mineral matter saturated with bitumen, and he was specially interested, for the purpose of the paper, with Alberta, where, over an area of some 200 square miles there were large supplies of bitumen sand containing from 10 to 20 per cent. of bitumen. Various processes had been evolved for washing and extracting the bitumen from the sand, but the only satisfactory process was one which overcame the molecular adhesion between the bitumen and the sand. It was this molecular adhesion which made water an unsatisfactory solvent, because the surface tension of water was not sufficiently low to bring about the effect desired. The re-agent used must have a low surface tension. It had been found, however, that a very dilute solution of soda, or a soap solution, was very effective. Dr. Fyleman showed, experimentally, how, by the addition of a small proportion of ordinary soda ash to a mixture of water and tar sand, the tar separated completely from the sand on heating, and he showed the same result on a larger scale also, the first experiment being carried out in a glass vessel and the second in a metal pot. There was a clear separation of the two constituents. Giving some idea of the cost of the process, the author said he based his estimates on a 200-day working year on account of the severe winter conditions, and he assumed a bitumen content of about 14 per cent. His estimates showed that the total cost of treating the material—*i.e.*, the cost of the alkali, supervision and capital, would be 38 cents per ton. That made no allowance for overhead charges or the cost of quarrying, but it showed that owing to the simplicity of the process the actual cost of working would be very small indeed. The plant he had taken as costing $200,000, but he believed that that was a too conservative figure. These figures applied to dealing with 1,000 tons of bitumen per day of twenty-four hours, from which would have to be deducted 125 tons for use as fuel, leaving the net amount 870 tons. The capital charges were taken on a 10 per cent. basis.

Discussion

In the discussion, the author was congratulated on the simplicity of the process, but certain criticisms were offered of his figures, and attention was also drawn to the fact that no allowance had been made for overhead charges and quarrying, which might prove to be more serious than was contemplated, owing to the fact that the material could only be worked at certain times of the year. Dr. Fyleman, in the course of his reply, said he had satisfied himself that the process could be worked economically, and if these deposits were to be handled at all then this was the way to do it.

Manchester Section

THE third meeting of the session was held on Friday, December 2, at the Textile Institute, Manchester, Dr. E. Ardern, F.I.C., in the chair.

Heat-Balance on Recovery Producer Plant

In a paper by W. H. Norris, B.A., B.Sc., F.I.C., the author described an ammonia recovery producer plant capable of gasifying 1,000 tons per week of bituminous slack, the cleaning plant of which purified 20 million cub. ft. of producer gas daily. The total capacity of the power plant was over 5,000 kilowatts per hour. Vertical gas engines were directly coupled with direct current generators, and much heat was recovered from exhaust gases in the form of steam from waste heat boilers.

Comprehensive data were shown in a series of curves over a period of eight months. During the whole of this time the coal was carefully sampled twice daily and the averaged sample analysed weekly. The power record was kept half-hourly and the waste products controlled weekly throughout the time. Individual engine tests were carried out and also boiler tests at intervals.

The overall efficiency of the station was shown throughout the whole time and individual efficiencies of the sections worked out as a result of gas measurements. From these and temperature measurements over the plant it was possible to draw up a heat balance representing a month's working, and illustrate the same by "trunk diagrams" showing the final distribution of the heat units which entered the producers either in the form of fuel or steam. These were compared with similar diagrams for steam turbine generators.

Direct Titration of Alkaline Manganates

Owing to the absence of Dr. J. J. Bloch, in Geneva, a note on this subject, prepared by him, was read by the Hon Sec. (Mr. L. Guy Radcliffe). Dr. Bloch stated that all published methods for the titration of alkaline manganates or permanganates solutions necessitated the acidification of the same previous to the titration or during titration. There were obvious disadvantages to such methods, especially when, to control a process in the works, a prompt determination was required. The method described in the note was not essentially new, being based upon the known reaction :

$$2(KMnO_4) + 3(MnSO_4) + 2\ ZnO = 5(MnO_2) + K_2SO_4 \quad 2(ZnSO_4).$$

Similarly it had been possible to titrate an alkaline permanganate according to the reaction :

$$2(NaMnO_4) + 3(MnSO_4) + 4\ NaOH = 5(MnO_2) + 3(Na_2SO_4) + 2aq.$$

and an alkaline manganate as follows :

$$Na_2MnO_4 + MnSO_4 = Na_2SO_4 + 2(MnO_2).$$

In practice the titration was done at 60-70° C., the manganate or permanganate solution being diluted with hot water to 250-300 c.cm., and a N/2 solution of manganese sulphate was run in slowly, a precipitate of hydrated manganese dioxide being formed, and it was allowed to settle and the addition continued until the supernating liquor was colourless. With a little practice, the end point was easily observed, and the titrations were fairly accurate and quickly done. The N/2 manganese sulphate solution was prepared from pure manganese sulphate free from iron, and the solution standardised against a normal standard permanganate solution in the presence of some zinc oxide.

This method of titration presented the further advantage that the excess of alkali over the quantity required by the given equations could be directly titrated after the manganate or permanganate determination. An aliquot portion of the clear decanted solution was used for that purpose and titrated with N/10 H_2SO_4.

Safeguarding of Industries Act

Resumed Hearing of Santonine Appeal

THE inquiry before Mr. Cyril Atkinson, K.C., the referee appointed under the Safeguarding of Industries Act, respecting santonine, was resumed at the offices of the Board of Trade on Friday, December 2. The case was brought by the Eastern and Russian Trading Co. and the Chemical Merchants' and Users' National Vigilance Committee, who contend that santonine should not be included in the list of articles chargeable with duty under Part I. of the Act. The previous proceedings were reported in our issue of November 25.

Board of Trade Theories

MR. SWAN (counsel for the complainants) further cross-examined Mr. Ronca (of the Board of Trade) as to the definition of a chemical. It had been said that a chemical was a substance used primarily for reacting purposes. Mr. Swan said he understood that "primarily reactive purposes" meant that if a chemical was caused to react with another chemical that would be using it for a primarily reactive purpose. Mr. Ronca agreed, and added that the result of the reaction would be the production of another definite chemical.

With regard to the preparation of alkaloids for commercial uses, Mr. Swan asked whether the process of preparation of alkaloids was simpler or more complex than the process of preparation of santonine. The witness replied that some alkaloids were much the same as santonine, but some might be different.

Dealing with the question of price, the witness agreed that the price of santonine had been somewhere about 7s. or 9s. per lb., and that the present price was in the neighbourhood of £33 per lb. Mr. Swan pointed out that of the santonine imported into England, not more than 3 per cent. was consumed in this country. The witness said he was not aware of the amount consumed, but he believed that a great proportion was exported, because the inhabitants of Eastern countries suffered most from the complaint for the curing of which santonine was used.

MR. SWAN produced a copy of the "Standard Dictionary of the English Language," 1905 edition, in which the definition of a fine chemical was "a substance obtained by, or used in, a chemical process."

MR. ATKINSON remarked that that was about the seventh definition; all of them differed.

As to reaction, Mr. Ronca said that research workers who had investigated santonine with a view to establishing a formula had prepared a great number of derivatives of santonine, showing that it reacted. The very effect of medicines largely depended upon chemical reactions. He also referred to a book written by Sir William Pope, on "Science and the Nation," in which the author stated that "Such chemical compounds may be roughly divided into "heavy" chemicals, which serve largely as raw materials in other branches of chemical industry, and "fine" chemicals, which consist mainly of high-priced finished products, such as dyestuffs, drugs, photographic chemicals, and the like."

At the Society of Chemical Industry's meeting in July, 1916, Messrs. Hill and Morson, in a paper on the fine chemical industry divided fine chemicals into three groups—reagents, pharmaceutical, and technical. An American book was also referred to, in which alkaloids and alkali salts had been classified under "chemicals." Under the classification of "chemicals" he found santonine.

The Purpose of the Act

MR. ATKINSON said the purpose of the Act was, obviously, to protect certain industries. "Industries" seemed to imply manufactures, or something akin to that. It was for the safeguarding of key industries, which meant that they were protecting the manufacture of some things which were going to be further used in the manufacture of other things. Was not that the idea of a "key" industry?

THE WITNESS said that a "key" industry was one capable of making something essential. That industry would provide the country with the organisation and the brains which could, if need arose, turn themselves in other directions, and, with the same equipment, the same plant, and the same mode of thought, produce things which were really vital.

MR. ATKINSON said that if his own definition were right, the manufacture of santonine was not a key industry, because it could not be used in any further process.

THE WITNESS said that the Board of Trade did not regard the manufacture of individual products as an industry in the sense of the Act. The industry that the Act covered, so far as chemicals were concerned, was really the chemical industry, other than the heavy chemical industry. They could not carry on the manufacture of these comparatively rare substances in competition with the world unless they were making use of an organisation and plant comparable with that which other people were using. The thing must be looked at as a whole, and not in parts; the schedule really did not deal with isolated things.

MR. ATKINSON said that a broad idea of the schedule would seem to be that the Act dealt with manufactured things, as well as things which were going to be used for the manufacture of something else. The witness's conception of "chemicals" seemed to wander from the declared purpose of the Act, and included many things which could not be called industries or manufactures. He wanted to get at what Parliament had in its mind when it said "chemicals."

Dealing with the exclusion of sulphate of quinine from the schedule, Mr. Parry said this was used for no other purpose than as a drug. In his view, the reason it was expressly excluded was that the supply of bark from which it was prepared was practically a Dutch monopoly, and British manufacturers could not get enough.

The Board of Trade's Case

MR. WHITEHEAD then addressed the Referee on behalf of the Board of Trade. Dealing with articles produced for use in the manufacture of other articles, he said he doubted whether there was an article in the schedule which could not be used in something else. If the Referee were to consider the matter from that point of view, why should the schedule stop where it did? A barometer, though an article in itself, was used, say, to enable a man to fly an aeroplane, and santonine fulfilled a similar purpose in its own sphere. The one common factor of all those industries was labour, and if the matter were looked at from the point of view referred to, there was no end to it. The view that the Board of Trade took on this question was that Parliament had said that a fine chemical was a substance which should be chargeable with duty, and, rightly or wrongly, the Board had said that once it was clear to them that any particular substance, whatsoever it might be, was a fine chemical, they were bound to put it into the list, if they issued a list at all. If the Board of Trade had not taken that view, then the Board would have been the real taxing body, and not Parliament, and a blow would at once have been struck at the very foundations of the constitution. Once the Board were satisfied that a substance was a fine chemical it had no option.

Dealing with the case put forward by the complainants, it was, first, that santonine was not a chemical; secondly, if it were a chemical, it certainly was not a fine chemical; and thirdly, even if it were a fine chemical, it was not a fine chemical within the meaning of the schedule. With regard to the first point, Mr. Swan had said that it was not a chemical because it was a drug or medicine. Whilst admitting that it was a drug, he (Mr. Whitehead) contended that that fact did not mean that it was not a chemical. Aspirin had been mentioned. Aspirin was undoubtedly a drug, but a well-known compound of salicylic acid. There were natural drugs; later these were imitated by synthetic and other processes, and then again, there were substances used simply as chemicals, the medicinal properties of which were discovered subsequently.

MR. ATKINSON asked whether it was counsel's contention that natural drugs were chemicals.

MR. WHITEHEAD said that a natural drug might possibly be a chemical, but he was submitting that whilst santonine was a drug, it was none the less a chemical because it was a drug. As to the point that santonine was not a chemical, because it was not prepared, but extracted, he referred to the evidence which had been given as to the process for obtaining santonine. They started with a living organism, treated it with chemicals, and chemical reactions took place. Then further reactions took place, and, finally, the santonine was crystallised out of the resulting compound. How it could be seriously suggested that santonine was not a prepared substance really passed his comprehension. He submitted that santonine was a chemical notwithstanding that it was a drug, that it had reactive qualities, and that it fulfilled every proper test that could be applied.

The next point was that if santonine were a chemical, it was not a fine chemical, and Mr. Swan had distinguished

between a chemical and an alkaloid. His answer to that, which he submitted was a conclusive one, was that santonine was not an alkaloid. Once it was established that it was a chemical, then, even on the evidence of Mr. Parry, it had all the attributes of a fine chemical. As to santonine being a fine chemical within the meaning of the Act, assuming it were established that it was a fine chemical, he submitted it should be included in the list. There was nothing in the two rules of construction which had been applied by Mr. Swan, and the Board of Trade had acted rightly in including santonine in the list of articles.

The Meaning of the Act

MR. ATKINSON asked counsel whether it was his view that he should look at the matter in precisely the same way as the Board of Trade, without any regard to whether it came within the spirit of the Act.

MR. WHITEHEAD said that if it were decided that santonine was a fine chemical, then it should be included. If that were established, then, following the intention of the Legislature, he submitted that Mr. Atkinson had no power to say that it should be removed from the list.

MR. ATKINSON said he understood that the Board of Trade had not considered the purpose of the Act at all, and whether or not they were helping an industry.

MR. WHITEHEAD replied that the Board of Trade had contended that Parliament had considered that.

Discussing this point further, Mr. Atkinson asked whether, supposing he were in doubt as to whether santonine were a chemical or not, because he was not inclined to think it was used for the purpose of chemical reaction, he could then say that the purpose of the Act was to protect industry, that the production of santonine affected nobody, that no labour was employed, and that the effect of including it in the list would be merely that people would have to pay more for the drug, which would be counter to the declared purposes of the Act.

In reply to this, Mr. Whitehead said that if Mr. Atkinson were in doubt as to construction, he could refer to Clause 1 (1) of the Act, which read: "Subject to the provisions of this Act, there shall be charged, levied and paid on the goods specified in the schedule to this Act, on the importation thereof into the United Kingdom, duties of customs equal to one-third of the value of the goods."

MR. SWAN, on behalf of the complainants, briefly summarised the evidence given. With regard to Mr. Parry's definition, he submitted that this was an absolutely clear and working hypothesis. The Board of Trade accepted that so far as it went, but they also said that they must include certain natural products. If they were going to extend that definition to include natural products, they had no justification in any literature, and no justification at all outside the Board of Trade chemists. He briefly reiterated the evidence as to santonine being an extract and not a manufactured product, and as to whether or not it was used primarily on account of chemical reactivity, and asked that a clear distinction be drawn between what were fine chemicals and what were vegetable bases. In conclusion, he impressed upon Mr. Atkinson that the complainants were a British corporation, that they had established in this country since the war the whole market for santonine, and that the effect of the imposition of the tax would be to transfer that market to Antwerp or some other neighbouring place. Only 3 per cent. of the santonine produced was used in this country, so that there was no reason why they should not go somewhere else.

This concluded the hearing. Discussing the giving of the Referee's decision, Mr. Whitehead suggested that Mr. Atkinson might wish to reserve his decision until more cases had been heard. Mr. Swan, on the other hand, pointed out that complainants' business was at a standstill pending the giving of the decision, and they were, naturally, anxious that it should be given as early as convenient.

Mr. Atkinson said he would like to go through the evidence again, and announced that he would give his decision on Saturday, December 10.

Caustic Soda: British Makers Wanted

AN important San Francisco firm invite us to put them in touch with manufacturers of caustic soda in Great Britain, preferably those familiar with the export trade. The sphere of the company's business is the Pacific Coast of the United States and Canada. British manufacturers interested in this matter may have further particulars on applying to THE CHEMICAL AGE.

Taxing Foreign Gas Mantles

Application under the Safeguarding Act

MR. CYRIL ATKINSON, K.C., began the hearing of a complaint with regard to gas mantles on Saturday, December 3. The application is by the British Association of Incandescent Gas Mantle Manufacturers, and by the nitrate of thorium manufacturers in this country, who claim that gas mantles should be included in the list of taxable articles published by the Board of Trade. The National Gas Council opposed the application, as did also the Board of Trade.

Mr. Terrell, K.C., and Mr. A. M. Latter appeared for the British Association of Incandescent Mantle Manufacturers; Sir Arthur Colefax, K.C., and Mr. Trevors Watson appeared for the nitrate of thorium manufacturers; Mr. J. Hunter Gray, K.C., and Mr. Jacques Abady appeared for the National Gas Council, and the Board of Trade was represented by Mr. Whitehead.

Mantle Manufacturers' Case

MR. TERRELL, K.C., in stating the general case for the complainants, pointed out that in the schedule to the Act it was expressly stated that among the articles which were to be subjected to duty under Part I. of the Act were thorium, cerium, and other rare earth metals, and the contention he was going to put forward was that gas mantles came within the meaning of those words. Describing the process of manufacture in detail, he said that the fabric only served the purpose of giving shape to the mantle and in the finished state the mantle was a compound of thorium and cerium oxide. When the finished mantle was put on a burner and burned off, it remained a compound of nitrate of thorium and nitrate of cerium, the fabric and the collodion having disappeared. In that state it was contended that the mantle was an anhydrous oxide of thorium, which was in the list which the Board of Trade had published. Nitrate of thorium and nitrate of cerium were used for no other purpose than for making incandescent gas mantles, except to a very slight extent in the manufacture of tungsten wire electric incandescent lamps and for laboratory purposes, and it must have been the intention of the Legislature to include gas mantles, when specifying nitrate of thorium and nitrate of cerium. It was obvious that the Legislature intended to safeguard certain special industries. There had been a great many definitions of the term "key" industries, but he was inclined to think that the best definition was that of capital industries producing material for a large number of other industries, irrespective of the question of the country being in a state of war. It would be for the referee to consider whether the whole of the gas mantles as delivered into this country were chargeable with the duty or whether the duty would have to be on that portion of the mantle which represented the nitrate of thorium and the nitrate of cerium. Reading the last section of the schedule, which relates to chemicals, counsel suggested that in connexion with this case it would also be necessary to define the words "fine chemicals."

THE REFEREE remarked, amid laughter, that he had already spent two days trying to do that.

MR. TERRELL said that "fine chemical" indicated great purity, and if ever there was an industry in which purity was essential in the ingredients it was the gas mantle industry. One-tenth per cent. impurity in the nitrate of thorium was fatal, and he therefore submitted that nitrate of thorium and nitrate of cerium came within the term "fine chemicals."

THE REFEREE said he would like Mr. Terrell's definition of a chemical.

MR. TERRELL said it was a very difficult task, but he could only define it as something which had a chemical reaction, and everything had a chemical reaction provided it was brought under proper conditions. The Referee had to put a meaning on the words "Compound of thorium." In these mantles there was undoubtedly a compound of thorium and cerium, whether it was a chemical compound or a mixture. Then there came the question of the meaning of the words "lost its identity." In this case, what they had to consider was whether the oxide of thorium or oxide of cerium had lost its identity; it would be childish to suggest that they had for they were still in the finished mantle. This section meant that the substance must have lost its identity chemically and was no longer the same, and they could not say that in regard to a mantle.

THE REFEREE asked what was the practice of the Customs in the case of an article in which the dutiable portion was very small.

MR. WHITEHEAD said he was instructed that it was the invariable practice of the Customs to charge only on the dutiable ingredient and not on the whole article.

A Chemist's Evidence

MR. H. BALLANTYNE, Vice-President of the Institute of Chemistry, and consulting chemist to the Welsbach Incandescent Gas Light Co., said he had examined several imported mantles from Germany, Italy, Poland, Austria and the United States, but as the industry of gas mantle making was conducted upon more or less secret processes, he did not wish to say too much about the details. He would certainly describe salts of thorium as a fine chemical owing to the very high degree of purity which was required. Salts of cerium must also have a very high degree of purity. Excluding the very small quantities of thorium nitrate used for scientific purposes, there was practically no other use for it than for the making of mantles, although he believed a small quantity was used in connexion with tungsten filaments of electric incandescent lamps. Many of the compounds of thorium given in the Board of Trade list he had never seen. The fabric of a mantle was simply a means of holding the thorium and cerium together. He regarded the mixture of thorium and cerium in a mantle as a physical mixture, although it had not yet been fully investigated. They could be separated quite easily.

For the National Gas Council it was put to Mr. Ballantyne that there were many more things in a mantle than merely thorium and cerium. Mr. Ballantyne replied that the quantities were extremely small.

MR. HUNTER GRAY said that the mantle contained collodion, asbestos, thorium oxide, cerium oxide, magnesium, didymium oxide, beryllium oxide, ash and alumina.

THE WITNESS agreed, but again added that the quantities were extremely small. In answer to further questions, he said that the thorium oxide represented about 75 per cent. of the total weight of the mantle. He would call a mixture of thorium oxide and cerium oxide a fine chemical, undoubtedly. It was necessary to mix the two together, and they had to be very pure indeed. He agreed, however, that a substance might be a fine chemical for one purpose and not for another. He understood that several definitions of a fine chemical had been put before the Referee, but he thought a better one could be put forward. At the same time, he did not wish to give it now, as certain patent proceedings were pending in which it would have to be given. The definition of a fine chemical must have relation to purity and the skill required in making it. It must also be prepared or manufactured and refined, and must require highly-skilled labour in its production to such an extent that labour and supervision were a substantial element in the price.

Cross-examined by Mr. Whitehead, for the Board of Trade, Mr. Ballantyne said that chemists talked continually of compounds when they meant mixtures; but generally a compound meant, to a chemist, a mixture of compounds, and there was always, in the mind of a chemist, a difference between a mixture and a compound. As to the loss of identity, there was little doubt that the thorium and cerium did not lose their identity in the mantle because they could both be recovered from it in about two hours. He had examined a mantle from Poland, and found that the thorium represented 70 per cent. of the total weight, cerium .7 per cent., and the remainder represented the other things which had been mentioned. The ash was infinitesimal.

The Customs Practice

MR. C. B. GRYLLS, assistant secretary of the Customs and Excise Department, said it was the practice to levy the duty on the dutiable ingredient only. The Customs had not yet had to deal with gas mantles.

Mr. C. S. Garland

MR. C. S. GARLAND, managing director of Lighting Trades, Ltd., and a vice-president of the Society of Chemical Industry, said he had been engaged in the manufacture of mantles for eleven or twelve years. If German competition was allowed to go on he was afraid that the mantle industry in this country would come to an end and with it the thorium nitrate industry. He was an active member of a committee of the incandescent gas mantle trade which, during the passing of the Safeguarding of Industries Bill, endeavoured to secure the insertion of gas mantles in the Bill. There was very strong agitation by importers to get mantles definitely excluded from the schedule, and every possible step was taken by the manufacturers to bring their case before members of Parliament.

MR. GRAY pointed out that in the discussion on the financial resolutions, the President of the Board of Trade mentioned that gas mantles were not included in the schedule because the manufacturers here were making large profits and could look after themselves.

THE WITNESS said he had not heard of those speeches, but the fact was that at present firms were not making profits. He believed the idea at that time, that large profits were being made, was due to the fact that the shares of one company went up from 12s. 6d. to £3. Continuing, witness said he doubted whether a one-third tax would be sufficient to protect the industry at the present time, but there were other provisions for dealing with the situation which, together, might save the industry. It was contemplated taking action under Part II. of the Act, which dealt with dumping. A tax of 66⅔ would about put the position right. The English wholesale price of mantles to-day was 60s. per gross. The price in Germany of a mantle was 5 marks 15 pf., and with the mark at about 1,000 to the sovereign that represented 15s. per gross. That was the internal price. The Germans had a very strong association which endeavoured to keep up the price in the export market, and to-day the export price of German mantles was from 36s. to 38s. per gross.

THE REFEREE: No wonder you do not do much business.

THE WITNESS: We do not, I assure you.

Mr. Edmund White

MR. EDMUND WHITE, managing director of Thorium, Ltd., confirmed the previous evidence as to the almost sole use of thorium nitrate and cerium nitrate for the purpose of manufacturing gas mantles. During the ten years he had been in business he had only sold about 10 kilos for other purposes. Owing to the competition of foreign gas mantles he had now accumulated a large stock of nitrate of thorium, which he had been endeavouring, unsuccessfully so far, to get rid of. His works were laid out for an annual output of from 40,000 to 50,000 kilos, but the present output was only about 20,000 kilos and steps were being taken to reduce that.

MR. WHITEHEAD cross-examined at some length as to the chemist's view of a compound, but the witness would not accept the view that a compound meant only a substance in which the ingredients were in chemical combination.

This closed the case for the complainants.

The Consumers' Point of View

MR. J. HUNTER GRAY, K.C., addressing the Referee on behalf of the National Gas Council, submitted that as mantles were not included in the schedule they could not be put into any list. Gas mantles were notoriously articles of great commercial importance, and the National Gas Council represented all the substantial gas industries of the country and about 90 per cent. of the undertakings, whether company or municipal. It would be detrimental to the users of mantles in this country that a tax of one-third should be put upon foreign mantles, as it would result in an inevitable increase in price. As it could not be denied that a gas mantle was an article manufactured from the raw materials, thorium and cerium, the mantle, as such, did not come within the schedule, and therefore could not be included in the list. Further, he contended that the expression "compounds of thorium and cerium" meant true chemical compounds and nothing else. It was unthinkable to him that if the Legislature intended to include gas mantles they did not include them in specific terms.

MR. WHITEHEAD, for the Board of Trade, said the Board could not put into the list anything not indicated in the schedule. Gas mantles, however, were not expressly mentioned in the schedule. Moreover, he read the schedule to mean that the taxable article was not a compound of thorium and cerium, but compounds of thorium and compounds of cerium which were separate things. A gas mantle was, if anything, a compound of thorium and of cerium and, therefore, was neither thorium nor cerium alone.

Mr. S. Ogilvie

At the resumed hearing on Monday, Mr. S. Ogilvie, joint manager of the National Gas Council, said that that body represented 97 per cent. of all the gas undertakings in the country, both company and municipal. Any tax upon imported gas mantles would be a serious thing from the point of view of public lighting and even more serious from the

point of view of the working classes, who used gas mantles so largely, and in a greater proportion than other classes. Moreover, gas lighting was experiencing severe competition from electricity for lighting, and any increase in the price of mantles would make that competition more severe.

This closed the case for the National Gas Council, but there was a little discussion between the Referee and Mr. J. Hunter Gray.

Legal Hair-Splitting

THE REFEREE said he understood the case put forward by Mr. Gray was that a mantle was a manufactured article of thorium and cerium, and that as the Act did not specify manufactured articles, as in the case of tungsten, it did not include gas mantles.

MR. GRAY agreed. That, in his view, was the only point, and he did not see that the Referee had anything to do with the question whether the thorium and cerium, as such, should be taxed or with the question of whether they lost their identity in the mantle.

THE REFEREE said the Board of Trade had come to the decision that the Act did not cover thorium and cerium as contained in a gas mantle but only when they were not in that form.

MR. GRAY said he was not aware of what the Board had done but in any case he submitted that it did not affect the question before the Referee now.

THE REFEREE: The case for the Board of Trade is that mantles are not taxable at all. Have I not power to say that some words should be put in to indicate that the thorium and cerium in a mantle should be taxed?

MR. GRAY thought not.

SIR ARTHUR COLEFAX then addressed the Referee for the thorium nitrate manufacturers. Thorium, he said, was practically used only for gas mantles. Unless the mantles were taxable, then the inclusion of thorium and cerium in the schedule was absolutely purposeless. It nullified the whole intention of the Act in regard to the gas mantle industry.

THE REFEREE said that at the moment he thought the mixture of thorium and cerium in a mantle was taxable as a mixture.

SIR ARTHUR COLEFAX submitted that as a mantle was substantially nothing but a compound of thorium and cerium it undoubtedly came within the schedule.

THE REFEREE said the mantle was at least a compound article, and then the question arose as to loss of identity.

MR. TERRELL, for the Incandescent Gas Mantle Manufacturers' Association, in his closing speech, said that the clear meaning of the word "compound" was that the article consisted of more than one thing, irrespective of whether it was a chemical combination or a mere mixture. Once that was established, then gas mantles came into the schedule almost automatically.

The Referee intimated that he would give his decision on Saturday, December 10.

Key Industries List

Chemical Merchants' Resolution favouring Revision

THE Chemical Merchants' and Users' National Vigilance Committee has unanimously adopted the following resolution in regard to the Safeguarding of Industries Act:

1. That after full and careful consideration, and bearing in mind that experiences during the war indicated that certain key industries should be fostered and safeguarded in the national interests, this committee are of opinion that the list, as published, is wider and more far-reaching than was intended, and does not show due regard to the scope and aims laid down during the consideration of the Bill by Parliament as to the powers conferred in the schedule of the Act, especially in relation to chemicals. 2. The committee are of opinion that the published list contains many articles that are not made in the United Kingdom, that could not be made at a reasonable price (if made at all), that do not come under the definition of "key industries," and that, therefore, the list should be revised by the deletion of such articles. (3) It is considered of paramount importance that a clear and authoritative definition be given of the precise meaning of the leading terms used in the schedule, as obviously such definition dominates the Act and limits its sphere and scope. (4) Many substances in the list which are used for industrial purposes are neither chemicals nor fine chemicals for the safeguarding of which the Act was intended, and as such substances are commercially pure, the word "crude" employed in the list should be replaced by the word "industrial" or the word "commercial" as being more in accord with the facts, and as being less liable to cause confusion and delay by the Customs authorities. (5) That with regard to substances designated "R" [pure chemicals], it should be clearly stated that when they are imported for industrial purposes, they are not subject to key industry duty, and that the duty is only applicable to chemically pure products for scientific and laboratory purposes, so that an importer may know when he makes a purchase whether the duty applies or not. (6) That there be issued uniform, clear, definite and understandable instructions by the Board of Trade and (or) the Commissioners of Customs, and that these instructions should be made public. (7) That provision should be made by the Customs authorities for the prompt and proper examination of the goods and for their release without any undue delay, and in the event of goods being held up, suitable accommodation should be provided for storage by H.M. Customs.

Corrections in Key Industries List

THE following corrections in the "Lists of Articles chargeable with duty under Part I. of the Safeguarding of Industries Act" (as issued by the Board of Trade in September, 1921) are notified for general information, and will be embodied in the next reprint of the list:

Page 43.—Insert prefix "R" before hæmoglobin.
Page 50.—Insert prefix "R" before menthol.
Page 54.—Insert prefix "R" before nickel oxide.
Page 65.—For "sodium monomethylarsonate" read "sodium monomethylarsenate.".

The Case of Boric Acid

WE are informed that Borax Consolidated, Ltd., miners of borates and refiners of borax, boric acid, &c., of 16, Eastcheap, London, have lodged a complaint with the Board of Trade against the inclusion of boric acid in the list of articles chargeable with duty under Part I. of the Safeguarding of Industries Act.

Port Sunlight War Memorial

To the memory of 481 employees of Lever Brothers, Ltd., who lost their lives in the war, a memorial designed by Sir W. Goscombe John and erected at Port Sunlight was unveiled on December 3 by ex-Sergeant T. G. Eames, an old servant of the company, who lost his sight at the first battle of the Somme. The names of 4,000 employees of Lever Brothers and its associated companies, who served, and their record in the war are commemorated in a golden book which has been deposited in a cavity in the monument. Referring to the promptness with which they enlisted, Lord Leverhulme said he had the honour, in the early days of the war, of accompanying a party of 700 Port Sunlight men to join the forces. Noble as had been the victory over their enemies, the task of winning the peace remained to be performed by the men who had returned.

Acid Phosphate Appeal

IN the King's Bench Division on November 30, Mr. Justice Branson heard an appeal in the matter of an arbitration between Mr. William Darragh and Vickers, Ltd., with regard to a dispute connected with a contract for the supply of acid phosphate. For the appellants, the respondents in the arbitration, Mr. Cyril Atkinson said the question was whether the amount of the award should be varied. The case arose out of two contracts for the sale by Vickers, Ltd., to Mr. Darragh of acid phosphate. The first contract was made in September, 1917, for 10 tons, and the second was in November of that year for 40 tons. The amount was afterwards altered to 50 tons. Delivery was to be completed by March 31, 1918; but only 19 tons had been delivered, owing to the claimant's complaints as to the percentage of sulphates present. In January, 1918, the claimant definitely cancelled the contracts and there was a counter-claim for damages in consequence. The date of the breach was said to be March 31, 1918. The arbitrator had found that the market price on that date was £80, and had awarded the claimant £930 on the 31 tons undelivered. His Lordship varied the award by substituting £620 for £930, each party to bear their own costs on the present application.

Manchester Chemical Trade

Sir S. W. Royse and Co.'s Monthly Report

THE volume of business has gradually declined during November, and latterly trade has been quiet, owing principally to the decreased requirements of the home textile trades. Overseas inquiry has improved, but the exchange position still restricts business. The trend of prices has been irregular, and neither manufacturers nor consumers are disposed to operate far ahead until they see more stability in values.

Sulphate of copper has been quiet, with only a limited business passing, although the price is easier. Green copperas is still in plentiful supply, but there is a better inquiry for export. Acetic acid and acetates of lime have remained steady, while stocks of acetates of soda and lead have been reduced, prices being well maintained. Nitrate of lead has been in good request. Carbonate of potash has been in steady demand, but there are good stocks on this side and prices are practically unchanged. Caustic potash has also been in regular inquiry, and the price has advanced somewhat. Muriate and sulphate of potash have been receiving more attention for both home and export; Montreal potashes have had little inquiry. There has latterly been some falling away in the demand for prussiate of potash, but prussiate of soda continues in request for both home and export account, and is very firm. White powdered arsenic has been selling readily, and the price is unchanged. Resale parcels of tartaric acid have been freely offered and values are rather easier, but the forward position is firm, while a steady business has been passing in cream of tartar. Stocks of citric acid are limited and the price is firmer. Prices of bichromates have been fixed for 1922, potash being 7¾d. and soda 6d. per lb.; chlorates of potash and soda are easier. Stocks of oxalic acid have been reduced and are firmly held. There has been a steady call for borax, and values are unchanged. Phosphate of soda has again declined. Alum and sulphate of alumina have been inactive. Muriate of ammonia and salammoniac have been in better request for export, but only in small quantities. Makers of ammonia alkali are now booking contracts for consumption over the next five years. Bleaching powder has been fairly quiet, but white caustic soda has been in better inquiry.

There is very little change in the position of tar products. Benzoles and toluoles are scarce and firm in price. Solvent naphtha is, if anything, slightly easier, with only a moderate amount of business passing. There has been little doing in creosote, and values have continued to fall. All grades of carbolic have remained lifeless; naphthalenes have been neglected. Pitch continues weak, and makers are disinclined to sell forward at the present level of prices. Sulphate of ammonia is in poor demand for the home trade, but a fair amount of business is passing for export.

Dutch makers of farina are holding firmly for their prices, but only a limited business is passing other makes of farina being freely offered at lower figures. Dextrine has been in steady request and prices remain unchanged. Turpentine has been dull and trade was confined to spot lots. Barytes has been in good request with some uncertainty as to future supplies from the Continent. The demand for paraffin wax and scale continues limited. Imported green olive soap is a little lower in price, and increased business has been done. Castor oil is quiet and the price is inclined to ease.

Royal Society's Anniversary Meeting

IN his presidential address at the 259th annual meeting of the Royal Society last week, Professor C. S. Sherrington emphasised the necessity for the continuation of adequate financial support for the Government for research work in universities. If the financial provision for research were too severely cut down it would mean the extinction of various investigations which could not be satisfactorily continued at all under narrower limits of expenditure than were imposed at present. The following officers and members of the council were elected: PRESIDENT, Professor C. S. Sherrington; TREASURER, Sir David Prain; SECRETARIES, Messrs. W. B. Hardy and J. H. Jeans; FOREIGN SECRETARY, Sir Arthur Schuster; OTHER MEMBERS, Sir Frederick Andrews, Professor V. H. Blackman, Sir William Bragg, Professor A. W. Crossley, Dr. H. H. Dale, Professor A. S. Eddington, Professor A. Fowler, Professor A. Harden, Professor J. Graham Kerr, Professor H. Lamb, Sir William Leishman, Sir Gerald Lenox-Conyngham, Lord Rayleigh, Professor O. W. Richardson, Sir Aubrey Strahan and Professor J. T. Wilson.

Lever Brothers' Co-partnership Scheme

The Spirit of Comradeship

AT Port Sunlight on December 2, Lord Leverhulme distributed co-partnership certificates to employees of Lever Brothers, Ltd., the co-partners who went on strike last year being re-admitted. Lord Leverhulme said the total number of co-partnership certificates issued represented a nominal value of £1,750,000. The amount allotted that day amounted to £351,484, and the number of new co-partners admitted overseas, and in all parts of the United Kingdom, was 3,328, bringing the total number up to 11,060. Although it was only thirty-two years last September since the firm moved its works to Port Sunlight, there were 332 employees of twenty-five years' service and over. Considering the small number of employees they started with, he felt proud of their long-service men, who had proved their efficiency. There were also 1,844 employees with fifteen years' service and over—a proud record for any firm. There was a misconception on the subject of co-partnership outside of co-partnership circles, the impression being that the value of co-partnership was the dividends. They had always known that was the least part of it. Its great value lay in the fact that they met together as comrades, that they were not hands and employers, but fellow human beings, with the same task in life to fulfil, to share prosperity and adversity together, and that they were partners. With employees numbering over 40,000 in different parts of the world it was impossible for him to get into personal contact with all, but co-partnership would give them that personal contact, and make them more useful than ever.

Dealing with the price of soap, Lord Leverhulme said that soap was sold at the lowest possible price in the United Kingdom. As soon as it had to be exported additional expense was incurred in packing and transit, and so the price was higher abroad. But they were dealing perfectly fairly with the consumers. The exportation of soap by Lever Brothers, and their associated companies, in normal times, was greater than that of the three greatest nations of the world added together.

Lord Leverhulme distributed a number of awards for long service, and the Hon. W. Hulme Lever presented gold watches in recognition of military distinctions.

Chemists' Work in the War

LECTURING at Perth last week on "Some Aspects of the Chemist's Work in the War," Principal J. C. Irvine, of St. Andrew's University, dealt with the work of the members of the various research laboratories in Britain in producing bacteriological sugars from which anæsthetics were procured. Relying as we did for such substances upon Germany, at the beginning of the war, the prices of many of the chemical sugars rose to as much as £15 per oz., but ultimately the precious substance was extracted from dahlias in sufficient quantities to meet the needs of the troops abroad.

Dealing with the employment of poison gas in warfare, Principal Irvine said that in the next war there would be no use for guns or even bomb-dropping aeroplanes, as chemistry had so far progressed that a war could be won or lost in a day or two through the use of gas.

Scottish Chemical Workers' Wage Dispute

A CORRESPONDENT of THE CHEMICAL AGE states that the workers at the Camelon Works of Cross's Chemical Co., Ltd., have come out on strike owing to a proposed reduction of wages and an extension of working hours. The firm pointed out to the men that the industry at the moment was in a very serious condition, and heavy loss was being incurred in keeping the works going. The works could not be kept open unless the men accepted their proposal. The firm undertook to make an effort to reopen a portion of the works which had been closed for some time, and also that, should conditions in the industry improve, the men's condition would be improved accordingly. The rate of wages offered corresponds to the 1914 wage, *plus* 100 per cent., and it was proposed that the hours should be increased from a working week of forty-eight hours to one of fifty-six hours. The employees have intimated that they are prepared to accept reduced wages only on condition that the hours of labour remain as at present.

German Chemical Trade Notes

FROM OUR OWN CORRESPONDENT.

Berlin, November 27, 1921.

AT the annual assembly of the Society for the Protection of the Interests of the Chemical Industry of Germany (Verein fur Wahrung der Futeressen der chemischen Industrie Deutschlands) the president, Dr. C. Duisberg (Farbenfabriken vorm. Friedrich Bayer & Co.), stated in the course of an address that in his opinion there was no possibility that Germany could pay the next two reparation payments due in January and February, according to the London ultimatum. For this aim it would be an imperative necessity to carry out the Munich resolution of the Empire's Association of German Industry, which made the well-known offer of a credit action on behalf of national economy based on the credits of German industry abroad. Perhaps they might succeed in making the Entente understand what the real economical conditions of Germany were, and that Germany was not able to pay. Only in that way could Germany get a revision of the Peace Treaty. If, however, at last the Ruhr districts were occupied, the consequences would not prove as heavy as had been suggested. Germany had endured already other evils.

Over-Production of Chemicals

In chemical industry throughout the world there appeared to be an enormous over-production to-day, because nearly every country which before the war bought dyestuffs and pharmaceuticals from Germany, during the war erected chemical factories of their own, or, after the Armistice, adapted ammunition plants to the manufacturing of peace commodities. So they tried to supply their own requirements in these products. While in this way world production was greatly increased, consumption fell off very much owing to the deficiency in the East and in the countries of low currency. In Germany, the chemical industry still held the second place in export up to 1920, but in the course of that year production diminished to a level far under the half of the former peace production, and likewise, returns decreased, although the prices went up. An improvement, which, however, would probably be only temporary, was noticed in recent weeks, owing to the catastrophical downfall of the mark. Because of the system of seclusion and the protection taxes, the countries which bought most formerly were falling short now.

Hostility to German Dyeing Industry

Foreign countries, he declared, seemed to be bent on the destruction of this branch of German industry. The keynote of the Peace Treaty was really the chemical disarming of Germany. The intention was to limit German chemical production to the inland requirements—that is, to about 15 per cent. of its present dimensions. The German industry of tar-dyes was to be destroyed almost completely, because it might be in a position to produce explosives and poisonous gases again and so to become a menace to the peace of the world. The men who talked most of this were Mr. Francis Garven, Dr. Charles Herty, U.S.A., and more recently the English writer, Major Victor Lefebure, the author of the "Riddle of the Rhine." What would be the consequence if this agitation, emanating from business jealousy, succeeded? The world would have to desist from getting German dyestuffs and would have to turn to the products of those new dyestuff-industries which were refused by the countries of production themselves. On the situation of the German chemical industry depended chiefly the maintenance of the population of Germany. Those who would ruin an export industry of the importance of the German chemical industry would subject the people to famine. Moreover, it depended on export whether Germany would be able to pay the reparation bills. Dr. Duisberg closed his speech by expressing a hope for a general economic understanding throughout the world.

"Bulletin" of the Cleveland Institute

IT is announced in the November number of the "Bulletin" of the Cleveland Technical Institute that owing to the hearty reception accorded to the first issue of the "Bulletin" it has been decided in future to issue it to any person, other than donors or members, at a subscription rate of 10s. 6d. per annum. It is also intended in subsequent issues to give a short list of the latest technical books relevant to the chemical and allied industries.

Removal of the British Oxygen Company

THE removal of the British Oxygen Co. from Wortan Road, Stratford, London, to Wembley, had a sequel in the Bow County Court on December 2, when, before Judge Graham, William James Rogers, of 16, Ross Road, Abbey Lane, Stratford, carman and contractor, sued Mr. R. J. Brown, of 50, Burton Road, Stratford, to recover £22 10s., cartage on two hydrogen gas holders. It appeared that a contract for the removal of the British Oxygen Co.'s goods had been given to Mr. Brown, he undertaking to shift 400 tons at £3 10s. per load, a load being about 4 tons. The plaintiff alleged that defendant, finding that at the moment he was unable to undertake the removal of some very large hydrogen holders, had engaged him to do the job for £15 for a specially large cylinder, and £7 10s. apiece for five others. After he had delivered two of the cylinders at Wembley the defendant told him that he would do the rest himself. Plaintiff had had to work during the night, as he said the largest cylinder was 10 ft. wide, which, under police regulations, could only be moved at night, when there was no traffic on the streets. His expenses for a wagon and trailer, loading and unloading, had been £18, so that he would only be making £4 10s. in demanding £22 10s. For the defendant, it was contended that the sub-contract had been given to a man of the same name, Samuel Rogers, of 143, High Street, Stratford, because the plaintiff's price was so high; Samuel Rogers having moved two other cylinders of the size mentioned by the plaintiff for £7 10s. Defendant was quite certain that the cylinders or hydrogen holders were 8 ft. 4 in. wide, and not 10 ft. wide, and that the removal by night had been done purely for the convenience of the plaintiff. The defendant had therefore only paid £7 10s. into court. Judge Graham decided that under the circumstances there had been a slight overcharge, but he would allow the plaintiff £18 and costs.

Work of the Higher Production Council

AT the second annual general meeting of the Higher Production Council, held at 6, Portland Place, London, Sir S. J. Waring (President), moving the adoption of the annual report, said that it was through an endeavour to satisfy the legitimate desire of those who felt that workmen had a right to some share in the surplus profits of industry beyond a mere wage, and a voice in the control of the conditions under which they work, that the Higher Production Council was formed. After very careful consideration of a number of schemes, they unanimously decided on the Priestman System as one that, if adopted, would be likely to conduce to a satisfactory co-operation between all parties. The scheme itself had been tried by the originators in their own works, and had been found most successful during the war period. Although those firms who had adopted the scheme had most excellent results, others had refrained from putting it into force because they felt that the present time was inopportune for any experiments. Though it might be difficult during this period of depression to obtain many more converts, they hoped to be able to play an interesting and useful part in the settlement of labour difficulties. On the motion of Mr. E. J. P. Benn, seconded by Mr. G. Isaacs, Sir Samuel Waring was re-elected President.

Affairs of the Slimes Treatment Syndicate

MEETINGS of creditors and shareholders were held on Tuesday, under the compulsory liquidation of the Slimes Treatment (Transvaal) Syndicate, of 28, Victoria Street, London, S.W. Mr. E. T. A. Phillips, Official Receiver, reported that the company was formed in 1907, to acquire from Mr. Alfred James his interest in the patents for the treatment of tailings of ore. The purchase consideration was £15,000, in fully-paid shares, which formed part of the issued capital of £25,504, while the uncalled capital was £19,495. As there was a surplus of £500 in assets over the liabilities, the chief duty of the liquidator would be to call up the uncalled capital to adjust the rights of the shareholders *inter se*. The liquidation was the result of differences of opinion between the directors upon the policy of the company. The liquidation was left in the hands of the Official Receiver.

The Making of a Mirror

The next monthly meeting of the Chemical Industry Club will be held on December 19, at 8 p.m., when DR. W. R. ORMANDY will give an address on "The Making of a Mirror."

From Week to Week

THE ADDRESS of the Lagunas Syndicate is now Palmerston House, 34, Old Broad Street, London, E.C. 2.

SAMUEL PITT & Co., 95, Bath Street, Glasgow, chemical merchants, were recently elected members of the Glasgow Chamber of Commerce.

A cable from the Melbourne office of NORTH BROKEN HILL, LTD., states that it has been decided to extend productive operations as soon as practicable.

An Order in Council further postponing the coming into operation of the MERCHANT SHIPPING (CONVENTION) ACT, 1914, until July 1, 1922, was notified in the *London Gazette* last week.

The first large cargo of ZINC CONCENTRATES has left Port Pirie, Australia, and is now on its way to the Welsh smelters. The Commonwealth Government proposes to run its own line of steamers to Swansea in this trade.

A magazine owned by Scottish Oils, Ltd., and situated at a shale mine at South Queen's Ferry, near Edinburgh, was completely destroyed by AN EXPLOSION on December 4. The watchman on duty at the time was unhurt.

The British Cellulose and Chemical Manufacturing Co., Ltd., 8, Waterloo Place, London, S.W., have placed upon the market a product known as "CELASTOID," which, it is claimed, has all the good and none of the bad qualities of celluloid.

DR. A. LAUDER has resigned the hon. secretaryship of the Edinburgh and East of Scotland Section of the Society of Chemical Industry. He will be succeeded by MR. W. T. H. WILLIAMSON, of the Edinburgh and East of Scotland College of Agriculture.

It is reported from Berlin that as the result of the EXPLOSION OF AN OIL TANK at the Nobel dynamite works at Saarlouis, on Monday, the works took fire. It is feared that a large number of workers lost their lives. Many of the employees were more or less seriously injured.

Considerable damage was caused by an EXPLOSION ON MONDAY in the gunpowder works of Curtis's & Harvey, Ltd., West Calder, Midlothian. Two men were killed, several were seriously burned, and the grinding mill in which the explosion took place, and three other mills in its vicinity, were totally destroyed.

The report of the Electrolytic Zinc Company of Australasia states that constructional costs have exceeded the original estimates and in consequence ADDITIONAL CAPITAL will be required, although the directors have definite assurances from the general manager and their technical officers that the expectations upon which the industry was originally launched will be fully realised.

At a meeting of the Midlothian and Haddingtonshire miners' executive last week it was stated that the Ministry of Mines has decided in favour of the Scottish miners' claim for a 20 per cent. REPAYMENT FOR EXPLOSIVES to contract workers in the collieries, which had been deducted from the earnings of these men, and that the colliery owners are liable to make up retrospectively the money thus due.

The Joint Industrial Council for the chemical trades met on December 1 at the Ministry of Labour to consider QUESTIONS OF WAGES, a further reduction having been threatened. The meeting broke up without any decision having been arrived at. The reduction issue, it is understood, is not at the moment critical, but the situation is regarded as somewhat delicate. It is reported that "extremely interesting developments" arising out of the attitude of the employers occurred at last week's conference.

At the meeting of THE FARADAY SOCIETY, to be held in the rooms of the Chemical Society, Burlington House, London, W.1, on Tuesday, December 13, at 8.15 p.m., Professor A. O. Rankine will deliver an address on "The Structure of Gaseous Molecules," which will be followed by a general discussion. Tickets of admission may be obtained from the Secretary of the Faraday Society, 10, Essex Street, London, W.C. 2. This meeting will be preceded by the annual general meeting, which is fixed for 7.45 p.m.

The next meeting of the SOCIETY OF GLASS TECHNOLOGY will be held in the Chemistry Lecture Theatre, University College, Gower Street, London, W.C.1, on Wednesday, December 14, at 2.45 p.m. The following papers are expected to be read: "Note on Pipettes," by Verney Stott; "Measuring small variations of Refractive Index throughout Meltings of Optical Glass," by A. J. Dalladay and F. Twyman; and "On the Annealing of Glassware," and on "Annealing without Pyrometers," by F. Twyman.

An inquest was held at Swansea last week on Richard Morris, a lead-worker, who had been employed at the White Rock Works for forty-two years. When taken ill he said he thought he had LEAD POISONING, but Dr. Powell, who had attended him, did not notice any signs of plumbism. A post-mortem examination revealed that Morris's death was due to cerebral hemorrhage induced by plumbism contracted during his life as a lead-worker. A verdict was returned in accordance with the medical testimony.

The Board of the Bradford Dyers' Association, Ltd., have passed a resolution to the effect that, being a very large user of coal in its thirty-eight works, and recognising the need for immediate efforts to promote a revival of the country's trade by a reduction in the cost of production, it urges upon the railway companies, in the interests of industry as a whole, the necessity of immediate substantial reductions in RAILWAY RATES FOR COAL. The resolution has been forwarded to the Railway Managers' Sub-Committee, Clearing House, London, and the Coal Association, London.

For his great work in chemistry and physics and the practical application of the results of his investigations to industry M. GEORGES CLAUDE has been awarded the Prix le Conte of 50,000f. by the French Academy of Science. M. Claude has, however, refused to accept this reward, and wishes the Academy to use the money to "soften the lot of unfortunate savants and their children" and to "ameliorate the precarious condition of scientific research in our country." He has therefore requested the Academy to devote 25,000f. to the Société de Secours des Amis des Sciences and 25,000f. to the research laboratories of the College of France.

A general meeting of the members of the Newcastle-on-Tyne Section of the Society's Chemical Industry will be held in the Chemical Lecture Theatre, Armstrong College, Newcastle, on December 14, at 7.30 p.m. The chairman will present SAVILLE SHAW MEDALS to Messrs. L. A. Sayce and A. Crawford, who will then read a short note on "The Estimation of Carbon Di-Oxide in Mineral Carbonates." It was on the basis of this work, that the authors were recommended for the award of the medal. Notes on "The Agglutinating Power of Some Durham Coals," by Mr. A. Weighell and "The Estimation of Lactose," by Mr. S. H. Collins will also be read.

Sir Kenneth Goadby, lecturing on Wednesday at the Royal Institute of Public Health on LEAD POISONING IN INDUSTRY, remarked that the problem as it affected painters had been thoroughly discussed at the recent International Labour Conference in Geneva. There were, he said, eighteen occupations in which lead poisoning arose and twelve others in which there was occasional risk, and this large number tended to exaggerate the importance with which this particular industrial disease had been regarded. The reported cases had shown a great falling off since the year 1900. Prevention consisted of the removal of the lead dust from the factory; it was a question of properly designed mechanical arrangements to draw the dust away from the worker. Not only the incidence of the disease, but the severity and the death-rate of the cases showed an enormous reduction through the application of scientific knowledge to the prevention of the disease.

The Danish State Railways invite tenders for the supply of various PIGMENTS, SOAPS, AND HEAVY CHEMICALS. The specification enumerates the following articles (the tons are metric tons): 2 tons of dry lead white in lumps, 4 tons red lead, 1½ tons of zinc white, 3 tons of lamp black, 1½ tons chestnut brown, 1 ton light umber, 1.6 tons French yellow ochre, 80 tons crystal soda, 10 tons of extra fine whiting, 2 tons polishing powder, 47 tons of soft green or brown soap and 3 smaller items of soaps, 2.2 tons of denatured spirits of wine for varnish and polish manufacture, 4 tons of turpentine oil (either French or mineral), 550 kgs. of nitric acid, 32 tons of 27 per cent. sulphuric acid for use in accumulators and 2½ tons of ammonia. Tenders are to be in the hands of the "Maskinafdelingens Kontor," Trommesalen 5, 3rd floor, Copenhagen, B., by 1 p.m. on December 29. A copy of the specification and conditions of tender (in Danish) can be seen by United Kingdom firms interested on application to the Department of Overseas Trade (Room 84), 35, Old Queen Street, Westminster, S.W.1. A copy is also available for firms in the provinces unable to arrange for its inspection in London.

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Abstracts of Complete Specifications

170,874. Artificial Silk, Manufacture of. E. Bronnert, 1, Quai du Barrage, Mulhouse, Alsace. Application date, April 30, 1920.

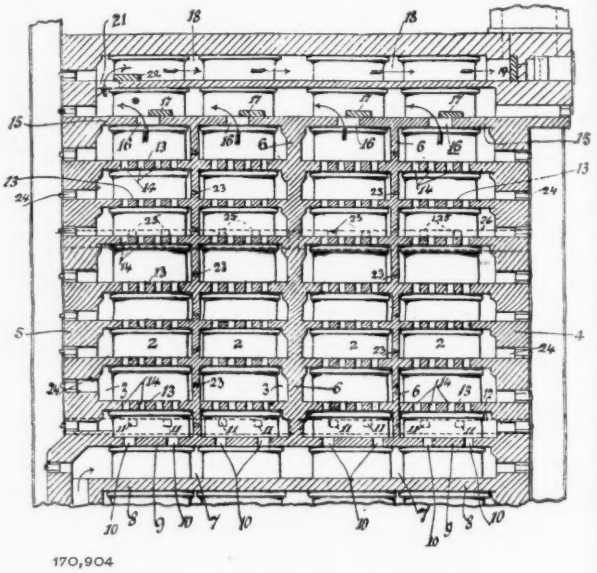
The process is for the manufacture of fine threads from viscose by the employment of a spinning bath consisting of bisulphites with or without formaldehyde or glucose. It has been found that the coagulating power of a bisulphite bath increases rapidly with the concentration of the bisulphite, but is practically independent of the concentration of the formaldehyde or glucose. To obtain very fine threads, the highest concentration of sodium bisulphite—*i.e.*, 360 grammes per litre—must be used, and the concentration must be maintained by the addition of the solid salt. The coagulating power may be still further increased by the use of a saturated solution of ammonium bisulphite at temperatures from 30°-80°C.

170,880. Sulphuric Acid, Manufacture of. A. Matheson, 29, Devonshire Chambers, 146, Bishopsgate, London. Application date, May 6, 1920.

Specification No. 158,293 (*see* The Chemical Age, Vol. IV., p. 312) describes a process for making a fertiliser by calcining alunite in the presence of water, whereby the oxides of sulphur and the water combine to form sulphuric acid which reacts with phosphates also present in the mixture. The present process is for isolating the sulphuric acid obtained in this manner. A typical sample of alunite may contain the following ingredients: Potash, 7.0 per cent.; alumina, 34.2 per cent.; sulphur trioxide, 38.5 per cent.; silica, 16.4 per cent.; ferric oxide, 1.0 per cent.; water, 2.2 per cent.; but the proportion of sulphur trioxide may vary from 18 to 38 per cent. The alunite is calcined in an externally-heated, muffled, and mechanically-rabbled furnace of the type having hearths one above the other. The crushed alunite is charged on to the uppermost hearth, and passes downwards over the lower hearths and is discharged at the bottom. The lowest hearth only is heated, to 700°-900°C., and a mixture of sulphur trioxide, sulphur dioxide, and oxygen is evolved. The gases pass upwards over the upper hearths, and in contact with the alunite and in the absence of air, the sulphur dioxide and oxygen recombine. This combination is assisted by the iron oxide serving as a catalytic agent. At the same time the gases are cooled and the descending alunite is heated. The amount of water necessary for the formation of sulphuric acid may be injected into the furnace as spray or as steam, or may be passed into the condenser together with the gases. It is found that the mixture of sulphur dioxide and oxygen combines readily to form sulphur trioxide when the gases are not diluted by the presence of atmospheric nitrogen.

170,904. Vertical Gas Retort Settings. F. Cummins, 6, Douglas Grove, Ackers Street, Oxford Road, Manchester. Application date, July 6, 1920.

The main objects are to produce uniform heating of all the retorts of the setting and to enable any selected retort or retorts to be heated or left unheated. The interior of the setting is divided into two chambers by a vertical wall extending from the front to the back, and in each chamber thus formed four vertical retorts 2 are arranged. The illustration is a vertical section taken through the combustion chambers which surround the retorts. The retorts of each row are joined by vertical walls 3, so that each chamber is subdivided into two chambers. Transverse walls 6 extend between the retorts, so that each retort is contained in a pair of vertical combustion chambers each of which extends around one half of it. These chambers are connected by openings 10 in a floor 9 to a common chamber 7, which is closed by a floor 8. Producer gas for heating the retorts is introduced into the chamber 7 at one end, and passes through the openings 10 into the combustion chambers. Secondary air inlets 11 are provided in the sides of each combustion chamber and are fed through horizontal passages 12 in the side walls of the setting. The retorts are supported as usual by horizontal partitions 13, having openings 14 through which the burning gases pass upwards to the outlets 16 leading into a common discharge flue. Each opening 16 is controlled independently by a damper 17, and the flue is connected by an opening 21 at one end to parallel flues 18, one on each side of the retorts, each flue being controlled by dampers 22 and 19. By this arrangement it is possible to control the heating on each side of each retort, each side of a row of retorts, each retort as a whole, and each row of retorts as a whole. Waste of fuel in heating unfilled retorts is thus avoided. To enable the conditions in the combustion chambers to be observed, the transverse walls



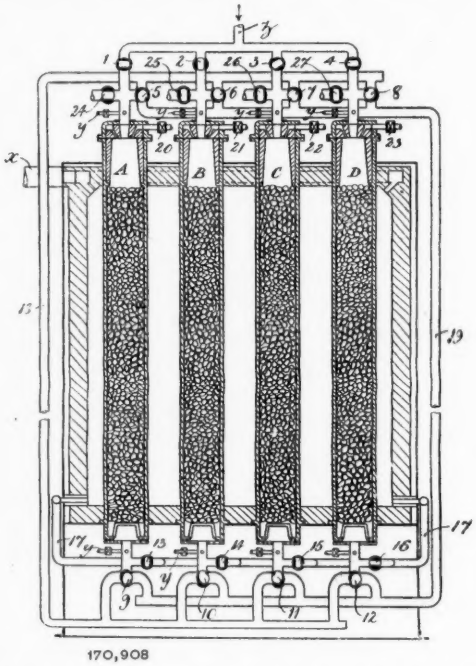
170,904

6 are made with thinner portions 23 arranged opposite to the inspection openings 24 in the front and back of the setting. These thinner portions reach a higher point of incandescence than the main portions of the wall. Additional air inlets 25 are provided at a higher level to ensure complete combustion of the producer gas in the upper portions of the combustion chambers.

170,908. Hydrogen, Production of. A. R. Griggs, 1, College Road, Bromley, Kent. Application date, July 10, 1920.

The apparatus is for the production of hydrogen by the alternate oxidation and reduction of iron by means of reducing gas such as blue water gas and steam respectively, and the object is to reduce the amount of water gas required. The earlier stages of the reduction are easily effected, but the final stages require an excess of reducing gas. If the reduction is effected in stages, and the gas from the earlier stages is purified from water vapour and carbon dioxide, the volume of gas is so reduced that fresh gas must be added to maintain the necessary velocity of flow through the apparatus. In this invention an initial reduction is effected in one chamber or retort by the use of gases which are derived from one or more of the later stages of the reduction. These partly-spent gases are freed from the bulk of the water vapour but not the carbon dioxide, and the diluting effect of the latter is compensated by the addition of fresh reducing gas. A saving is thus effected in the total amount of reducing gas without the necessity of purification, and without interference with the continuity of the process. In the example illustrated, the process is divided into four stages, A, B, C, D, the retorts being enclosed in a refractory casing into which gas and air are supplied, while the combustion products are discharged through a flue *x*. The gases then pass through heat interchangers to preheat the reducing gas, steam and air. Steam supply pipes *y* are provided at each end of each retort, while the reducing gas is supplied through the pipe *z*. The reducing gas may be passed through any retort by the valves 1, 2, 3, 4, and the effluent gas may be passed into the furnace by the valves 13, 14, 15 or 16, and pipes 17. The effluent gas may alternatively be led into any retort for further reduction by means of the valves 9, 10, 11, 12, pipes 18, 19, and valves 5, 6, 7, 8, and an apparatus for removing water vapour is arranged in this circuit. This gas may also be used

for internal heating of the retorts by adding preheated air through the valves 20, 21, 22, 23. In the arrangement shown, the retort A is in the hydrogen-making stage, and the retort B is in the final reduction stage, fresh reducing gas being introduced by the valve 2. The



170,908

effluent gas is still rich, and is passed through valve 10, pipe 19, and valve 7, to the next reducing stage C, being supplemented by fresh gas through the valve 3. The effluent gas from this stage is passed into the fourth stage D for internal heating. Portions of the gas may be diverted into the heating furnace. This process is then repeated, hydrogen being made in the retort B.

170,911. Solutions Containing Aluminium Formate and an Alkali Salt, Production of. R. Wolffenstein, Luciusstrasse 7B Berlin-Grunewald, Germany, and Chemische Fabrik vorm. Goldenberg, Geromont & Co., Winkel-on-Rhine, Germany. Application date, July 20, 1920

The process is for producing a substance which when mixed with water yields a clear solution of aluminium formate containing an alkali salt. An alkali formate is mixed with an aluminium salt, such as the sulphate, which contains a stronger acid component than formic acid. The proportions should be those theoretically necessary for complete double decomposition. The mixture may also be obtained in a solid form by mixing together the aluminium salt and sodium formate in the same proportions in desiccated form. The desiccation need not be complete and is perferably effected by heating the materials in a vacuum. It is found that although aluminium sulphate and sodium formate are stable compounds with or without desiccation, the use of non-desiccated materials does not produce a product which is soluble in water to form a clear solution and is also stable over a period of time.

170,944. Ore Concentration. L. A. Wood, 62 London Wall, London, E.C.2, W. G. Sellers, 2 King John's Court London, E.C. 2, and Minerals Separation Ltd., 62, London Wall, London, E.C. 2. Application date, July 30, 1920.

In the froth flotation process for the concentration of ores, mineral frothing agents may be used which are obtained from the distillation of coal, wood, mineral oil, and the like. These frothing agents may be substances such as coal tar, wood tar, blast furnace tar, producer gas tar, viscous fuel oil, or viscous tar oil. It is now found that the efficiency of the frothing agent may be increased by subjecting the viscous material to a preliminary treatment with an emulsifying agent such as caustic alkali. This emulsification produces three results, (1) The reduction of the viscosity of the tar or the like, so that mechanical agitation reduces it to a fine state of subdivision and renders it suitable for use without heating, (2) The free surface of the emulsified substance is largely increased, and consequently its frothing qualities, (3) The addition of alkali neutralises the acid constituents such as phenols, cresols, and acid tars. The emulsifying agent used must be one which renders the viscous substance emulsifiable in water or which reacts chemically with it, yielding products which render the viscous substance emulsifiable. Alkali hydroxides and carbonates, soaps or sodium resinate, may be used for this purpose. The reaction is facilitated by heating the mixture to 50°-100°C. Several examples of the preparation of the frothing agent are given, and also the results of test with copper ores. In one example in which the frothing agent was obtained from Stockholm tar, the recovery of copper represented 96 per cent. of the total copper.

170,964. High Percentage Sulphite Cellulose, Process for the Production of. E. Bronnert, 1, Quai du Barrage, Mulhouse, Alsace. Application date, Aug. 4, 1920.

This process for producing sulphite cellulose rich in pure cellulose includes a preliminary treatment of the wood with dilute sulphuric acid, so as to decompose the wood lignine and render it soluble during the boiling process with calcium sulphite lye. The wood is subdivided and treated with sulphuric acid of about 1 per cent. strength at 115°C. under pressure, for two to four hours. The acid is run off, and the mixture neutralised and immediately boiled with calcium bisulphite or magnesium calcium sulphite containing 3 to 3.5 per cent. of sulphurous acid. The amount of boiling necessary is reduced by this preliminary treatment, and a cellulose containing up to 99 per cent. of alpha cellulose is obtained.

170,982. Filling Material for Use in Glover Towers and Similar Apparatus. P. Kestner, 38, Rue Ribera, Paris. Application date, Aug. 18, 1920. Addition to 131,502.

Specification No. 131,502 (*see* The Chemical Age, Vol. I., p. 422) describes a process for forming rings for use as packing material in Glover towers by pressing ceramic material into moulds. In the present invention the rings are formed from the ceramic material by means of cutting punches. The

Fig. 2.

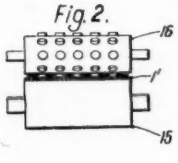
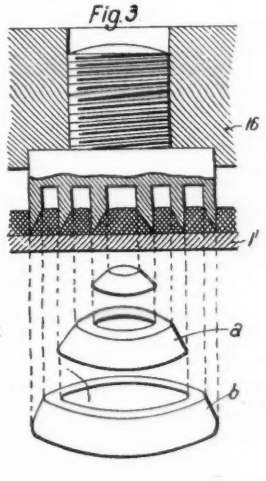


Fig. 3



170,982

ceramic material is forced by a piston between a compressing cyclinder and an endless band so that it is carried by the band as a layer of uniform thickness. The layer passes between two rollers, one of which is provided with cutting punches. The cut rings thus formed are carried by a band through a chamber through which hot air is circulated, and are thereby dried. The rings are then discharged by another conveyor band. The illustration shows the travelling band 1′ passing between the plain roller 15 and the punching roller 16, while the rings *a*, *b*, are shown in perspective. The diameter is from 1 to 2 centimetres and the thickness 1 to 3 millimetres.

171,046. Indiarubber Compounds, and Process of Manufacture. C. F. S. Bilbrough, Hill House, Burnham-on-Crouch, Essex. Application date, Nov. 30, 1920.

The process is for the manufacture of compounds of india-rubber and filling materials such as finely-divided recovered or other rubber, wood dust, magnesium carbonate, cotton, wool, silk, jute, hair, leather, or waste cotton, silk, hair, jute or wood pulp. The composition is manufactured directly from the rubber latex without first converting it into solid rubber. The rubber latex may be first partly deprived of water by boiling, but preferably by heating not above 130°F. When the latex has become thick, the filling material is added together with any colouring material. In one example, the filling material consists of peat 15 per cent., flowers of sulphur 2 per cent., cocoanut fibre dust 5 per cent., cotton mill dust or finely-divided cotton or wool waste 5 per cent., and a small quantity of china clay and/or finely-divided recovered rubber. As a preservative, about 1 per cent. of salicylic acid or 0.5 per cent. of carbolic acid or cresoote may also be added. The mixture is then pressed or moulded into the required shape and dried. The product may be finally vulcanised if desired.

Note.—Abstracts of the following specifications which are now accepted appeared in The Chemical Age when they became open to inspection under the International Convention : 142,806 (Barrett Co.) relating to resin from naphthas, *see* Vol. III., p. 109 ; 145,802 (Akt.-Ges. fur Anilin Fabrikation) relating to dyestuffs of the acridine series, *see* Vol. III., p. 294 ; 146,183 (A. Irinyi) relating to distillation of tar and other liquids, *see* Vol. III., p. 321 ; 146,396 (E. Otsuka) relating to concentrating ores by flotation, *see* Vol. III., p. 353 ; 146,407 (H. Berger) relating to nickel catalyst, *see* Vol. III., p. 353 ; 151,259 (Norske Aktieselskab for Elektrokemisk Industri-Norsk, Industri-Hypotekbank) relating to alumina obtained from aluminium nitrate solutions, *see* Vol. III., p. 664 ; 155,226 (Barrett Co.) relating to manufacture of coke, *see* Vol. IV., p. 229.

International Specifications not yet Accepted

170,264. Hydrocarbon Oils. K. Kobayashi, 110, Suwa, Totsuka Machi, Toyotama Gun, Tokyo Fu, Japan. International Convention date, October 13, 1920.

Japanese acid clay is mixed with fatty fish oils and distilled above 500°C. The oil obtained is fractionally distilled, and the fraction purified by treatment with acid and alkali. The oil obtained resembles petroleum.

170,275. Fuel. L. Crespin, 35, Route d'Enghien, Argenteuil, Seine-et-Oise, France. International Convention date, October 15, 1920.

A mixture containing a fuel of vegetable origin such as lignite and 2-6 per cent. of potassium chloride, sulphide or carbonate is briquetted and dried to form a fuel. The ash from this fuel fuses to a slag.

Latest Notifications.

171,970. Synthesis of ammonia. L'Air Liquide Soc. Anon. pour l'Etude et l'Exploitation des Procédés G. Claude. November 20, 1920.

171,972. Synthesis of ammonia. L'Air Liquide Soc. Anon. pour l'Etude et l'Exploitation des Procédés G. Claude. November 20, 1920.

171,981. Process for dyeing animal or mixed fibres. Akt.-Ges. für Analin-Fabrikation. November 26, 1920.

172,009. Manufacture of sulphuric acid by the towers process. Moritz, R. November 23, 1920.

172,010. Construction of mechanical sulphate furnaces. Moritz, R. November 23, 1920.

172,011. Apparatus for measuring acids and other liquids. Moritz, R. November 23, 1920.

172,027. Process for the formation of cyanic compounds. Mehner, H. November 26, 1920.

Specifications Accepted, with Date of Application

147,001. Anthraquinone derivatives, Manufacture of. A. G. Bloxam (*Farbwerke Vorm. Meister, Lucius, & Brüning*). July 6, 1920.

147,495. Alkali chlorides, Decomposition of. J. Kersten. July 8, 1920.

147,736. Ammonia, Direct recovery of—from the products of the destructive distillation of coal and the like. C. Still (Firm of). December 3, 1915. Addition to 28,072, 1912.

147,904. Cellulose acetate, Process for the production of moulded articles from. A. L. Mond (*Cellon-Werke Dr. A. Eichengrün*). July 9, 1920.

148,117. Plastic masses, Production of. H. Feldmann. May 14, 1918.

149,982. Resin, Production of. Barrett Co. August 28, 1920.

150,996.—Coke-ovens. A. G. A. Charpy. September 10, 1919.

155,595. Fat-dissolving substances, Process for the production of. H. T. Böhme Akt.-Ges. December 19, 1919.

155,782. Fatty acids of high purity and melting point, Process for producing. J. Starrels. March 1, 1916.

160,433. Anthraquinone derivatives, Manufacture of. A. G. Bloxam (*Farbwerke Vorm. Meister, Lucius, & Brüning*). July 8, 1920. Addition to 147,001.

164,358. Distilling petroleum and other hydrocarbon oils under pressure, Process and apparatus for. Standard Oil Co., of New York. October 20, 1913.

165,735. Coke ovens or the like. American Coke & Chemical Co. July 11, 1919.

171,418. Chlorine compounds which may be rendered dispersible, Preparation of. W. H. H. Norris and J. H. Hoseason. May 7, 1920.

171,432. Cellulose acetate and like cellulose derivatives, Process for the production of moulded articles from. A. L. Mond (*Cellon-Werke Dr. A. Eichengrün*). July 9, 1920. Addition to 147,904.

171,464. Gas-burners of coke ovens. Coke & Gas Ovens, Ltd., and A. R. Smee. August 12, 1920.

171,479. Alcohol, Preparation of. W. R. Walkey and A. F. Bargate. August 16, 1920.

171,488. Gas-producers. J. F. Wells. August 17, 1920.

171,490. Separation and recovery of metals from metal alloys, Method for. A. L. Mond (*Metallbank und Metallurgische Ges.*). August 18, 1920.

171,491. Cupolas or melting or heating furnaces or the like. W. H. Wood and D. H. Wood. August 19, 1920.

171,495. Hydrogen gas from iron and steam, Retort furnace with external firing for the generation of. M. Nöding. August 20, 1920.

171,502. Electrolytic apparatus. G. O. Seward. August 23, 1920.

171,543. Conveyors. W. Reid. September 8, 1920.

171,551. Conveyors. British Mathews, Ltd., and C. Hannaford. September 10, 1920.

171,563. Distilling carbonaceous materials, Apparatus for. G. W. Wallace. September 24, 1920.

171,652. Crushing, pulverising, grinding, and like mills. J. S. Withers. (*Etablissements C. H. Candlot Soc. Anon.*). March 29, 1921.

Applications for Patents

Akt.-Ges für Anilin-Fabrikation and Bloxam A. G. Manufacture of dye-stuffs. 31,838. November 28.

Bedford, F. Process for manufacture of soap. 32,490. December 3.

Bergius, F. Process for treatment of carbon and hydrocarbons by heat and pressure. 32,146. 32,147. November 30.

Crosfield & Sons, Ltd., J. & Wheaton, H. J. Means for removing and recovering vapours from gases. 31,961. November 29.

Dreyfus, H. Treatment of cellulose derivatives. 32,086. 32,087. 32,088. November 30.

Gray, S. S. Apparatus for delivering measured quantities of liquid. 31,880. November 29.

Hayes, A. Apparatus for measuring and delivering predetermined quantities of liquids. 32,103. November 30.

Laing, B., & Neilsen, H. Manufacture and utilisation of formic acid. 32,504. December 3.

Löffler, S. Process for treatment of carbon and hydrocarbons by heat and pressure. 32,146. 32,147. November 30.

Mauclère, P. A. P. V. Safety apparatus for manipulation of liquids with semi-recuperation of gaseous fluids. 32,486. December 3. (France, December 6, 1920).

Plauson's (Parent Co.), Ltd., & Plauson, H. Process for production of plastic masses from mica, asbestos, &c. 31,875. November 29.

Plauson's (Parent Co.), Ltd., & Plauson, H. Process for refining mineral oils, petroleum, &c. 31,876. November 29.

Plauson's (Parent Co.), Ltd., & Plauson, H. Process for production of mixtures of rubber and artificial resins. 30,083. November 30.

Plauson's (Parent Co.), Ltd., & Plauson, H. Concentration of solutions of colloidal dispersions. 32,335. December 2.

Plauson's (Parent Co.), Ltd., & Plauson, H. Recovery of oils, tar, resin, &c. from sbale, bleaching-earths, peat, &c. 32,336. December 2.

Selden Co., Selden, C. G., & Selden, J. M. Apparatus for effecting fractional condensation of mixtures of vapours of volatile bodies. 32,124. 32,125. 32,126. November 30.

Soc. of Chemical Industry in Basle & Imray, O. Y. Manufacture of β-thionaphthisatin. 32,234. December 1.

Weyman, G. Neutralisation and drying of sulphate of ammonia. 32,216. December 1.

Zeiss, C. [Firm of]. Refractometers for liquids. 31,748. November 28. (Germany, December 13, 1920).

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

Market Report

Thursday, December 8, 1921.

THE demand for chemicals has been fairly well maintained during the past week, but with the approaching end of the year buyers are restricting their requirements as far as possible. Generally speaking, prices are firm and on the whole the tendency is upwards.

Export inquiry has been rather quieter.

General Chemicals

ACETONE is in active enquiry, and the price is well maintained.

ACID ACETIC is decidedly firmer, and secondhand prices are slowly approaching makers' limits.

ACID CITRIC is unchanged.

ACID FORMIC has been in better demand; stocks are firmly held.

ACID OXALIC has been a little more active, and as stocks decrease a better standard of value is to be anticipated.

ACID TARTARIC is on offer in a number of directions, and the tendency is weak.

ARSENIC has been without special feature.

BLEACHING POWDER remains slow of sale.

COPPER SULPHATE is unchanged.

FORMALDEHYDE has been in better demand, and prices are fully maintained.

IRON SULPHATE is a slow market, but the tendency is firm.

LEAD ACETATE.—The demand is still very slow indeed, and the tendency remains in buyers' favour.

LEAD NITRATE is unchanged.

LITHOPONE.—Stocks are moving slowly, but with the turn of the year a better demand is expected.

POTASSIUM CARBONATE.—There are heavy stocks which are freely offered, and the tendency remains weak.

POTASSIUM CAUSTIC is perhaps a little better in tone, but the volume of business does not attain any considerable proportions.

POTASSIUM CHLORATE is firmer, consequent upon strong export demand.

POTASSIUM PRUSSIATE.—A few small parcels have been offered from the continent, and the price is inclined to ease slightly.

SODIUM ACETATE is in fair enquiry and exhibits a rising tendency.

SODIUM CAUSTIC.—There is still a certain activity, but the demands of some markets now seem to have been satisfied.

SODIUM NITRITE is unchanged.

SODIUM PRUSSIATE is very firm indeed. A certain business has been done for delivery over the first few months of next year, and higher prices are expected.

Coal Tar Intermediates

Business continues on quiet lines, but a fair enquiry has been received and the general tone is rather better than has been the case of late.

ALPHA NAPHTHOL continues unchanged.

ALPHA NAPHTHYLAMINE continues to pass steadily into consumption at recent figures.

ANILINE OIL AND SALT continue firm at makers' price.

BENZALDEHYDE has been enquired for.

BENZIDINE BASE continues in quiet request at recent values.

BETA NAPHTHOL is steady.

DIMETHYLANILINE has been enquired for both on home and on export account, and is in fairly short supply.

DIPHENYLAMINE continues firm in request for home and export.

"H" ACID has been slightly more interesting.

NITROBENZOL.—The usual regular orders have been received, but otherwise this intermediate is quiet.

PARANITRANILINE is steady, with a small consumption going on.

RESORCIN is slightly easier.

Coal Tar Products

The general tone of the market in coal tar products seems to be rather better and a larger volume of business has been done during the last week than has been the case for some time. Prices, however, maintain their downward tendency.

90's BENZOL is obtainable at 2s. 6d. per gallon on rails, and is fairly plentiful.

PURE BENZOL has only a moderate demand. Supplies are scarce. It is quoted at 3s. 6d. to 3s. 8d. a gallon on rails in the Midlands, and 4s. in London.

CREOSOTE OIL is rather more active, and is worth 6d. on rails in the north and 6½d. in the south.

CRESYLIC ACID is worth 2s. 2d. to 2s. 3d. on rails for the Pale quality and 1s. 9d. to 1s. 11d. for the Dark.

SOLVENT NAPHTHA is very quiet and is worth about 2s. 5d. on rails in the Midlands and 2s. 10d. to 2s. 11d. in London.

NAPHTHALENE remains weak with moderate enquiry.

PITCH.—There is a slight improvement in the demand, and the market is somewhat firmer. To-day's quotations are 40s. to 42s. 6d. per ton f.o.b. East Coast port, and 45s. per ton to 47s. 6d. per ton f.o.b. London.

Sulphate of Ammonia

THE position is unchanged, and prices are maintained.

Current Prices

Chemicals

	per	£	s.	d.		£	s.	d
Acetic anhydride	lb.	0	2	1	to	0	2	2
Acetone oil	ton	87	10	0	to	90	0	0
Acetone, pure	ton	87	10	0	to	90	0	0
Acid, Acetic, glacial, 99-100%	ton	52	10	0	to	55	0	0
Acetic, 80% pure	ton	45	0	0	to	48	0	0
Arsenic	ton	95	0	0	to	100	0	0
Boric, cryst	ton	65	0	0	to	68	0	0
Carbolic, cryst. 39-40%	lb.	0	0	6½	to	0	0	7
Citric	lb.	0	2	5	to	0	2	6
Formic, 80%	ton	65	0	0	to	67	10	0
Gallic, pure	lb.	0	3	10	to	0	4	0
Hydrofluoric	lb.	0	0	8½	to	0	0	9
Lactic, 50 vol	ton	40	0	0	to	43	0	0
Lactic, 60 vol	ton	43	0	0	to	45	0	0
Nitric, 80 Tw	ton	38	0	0	to	40	0	0
Oxalic	lb.	0	0	8	to	0	0	8½
Phosphoric, 1.5	ton	45	0	0	to	47	0	0
Pyrogallic, cryst	lb.	0	7	6	to	0	7	9
Salicylic, Technical	lb.	0	1	2	to	0	1	3
Salicylic, B.P	lb.	0	1	6	to	0	1	8
Sulphuric, 92-93%	ton	8	0	0	to	8	10	0
Tannic, commercial	lb.	0	3	0	to	0	3	6
Tartaric	lb	0	1	5	to	0	1	6
Alum, lump	ton	18	0	0	to	18	10	0
Alum, chrome	ton	37	10	0	to	40	0	0
Alumino ferric	ton	9	0	0	to	9	10	0
Aluminium, sulphate, 14-15%	ton	12	0	0	to	13	0	0
Aluminium, sulphate, 17-18%	ton	15	0	0	to	16	0	0
Ammonia, anhydrous	lb.	0	1	10	to	0	2	0
Ammonia, .880	ton	35	0	0	to	37	0	0
Ammonia, .920	ton	22	0	0	to	24	0	0
Ammonia, carbonate	lb.	0	0	4	to	—		
Ammonia, chloride	ton	60	0	0	to	65	0	0
Ammonia, muriate (galvanisers)	ton	45	0	0	to	47	10	0
Ammonia, nitrate	ton	55	0	0	to	60	0	0
Ammonia, phosphate	ton	90	0	0	to	95	0	0
Ammonia, sulphocyanide	lb.	0	3	0	to	0	3	0
Amyl acetate	ton	150	0	0	to	160	0	0
Arsenic, white, powdered	ton	42	0	0	to	44	0	0
Barium, carbonate, 92-94%	ton	12	10	0	to	13	0	0

	Per	£	s.	d.		£	s.	d.
Barium, chlorate	lb.	0	0	11	to	0	1	0
Chloride	ton	15	0	0	to	16	0	0
Nitrate	ton	42	10	0	to	45	0	0
Barium Sulphate. blanc fixe, dry	ton	26	0	0	to	28	0	0
Sulphate, blanc fixe, pulp	ton	16	0	0	to	16	10	0
Sulphocyanide, 95%	lb.	0	1	6	to	0	1	0
Bleaching powder, 35-37%	ton	14	0	0	to		—	
Borax crystals	ton	31	0	0	to	32	0	0
Calcium acetate, Brown	ton	8	0	0	to	9	0	0
,, ,, Grey	ton	10	0	0	to	11	0	0
Calcium Carbide	ton	22	0	0	to	23	0	0
Chloride	ton	8	10	0	to	9	0	0
Carbon bisulphide	ton	60	0	0	to	62	0	0
Casein, technical	ton	85	0	0	to	90	0	0
Cerium oxalate	lb.	0	3	6	to	0	3	9
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	11	0	to	0	11	6
Oxide, black	lb.	0	10	6	to	0	11	0
Copper chloride	lb.	0	1	3	to	0	1	6
Sulphate	ton	29	10	0	to	30	10	0
Cream Tartar, 98-100%	ton	125	0	0	to	130	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde 40% vol	ton	85	0	0	to	90	0	0
Formusol (Rongalite)	lb.	0	3	9	to	0	4	0
Glauber salts, commercial	ton	5	5	0	to	5	10	0
Glycerine, crude	ton	70	0	0	to	72	10	0
Hydrogen peroxide, 12 vols	gal.	0	2	8	to	0	2	9
Iron perchloride	ton	35	0	0	to	40	0	0
Iron sulphate (Copperas)	ton	4	0	0	to	4	5	0
Lead acetate, white	ton	42	10	0	to	45	0	0
Carbonate (White Lead)	ton	44	0	0	to	47	0	0
Nitrate	ton	48	10	0	to	50	10	0
Litharge	ton	35	10	0	to	36	0	0
Lithopone, 30%	ton	26	0	0	to	28	0	0
Magnesium chloride	ton	12	0	0	to	13	0	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	9	10	0	to	10	0	0
Sulphate (Druggists')	ton	15	10	0	to	17	10	0
Manganese, Borate	ton	70	0	0	to	75	0	0
Sulphate	ton	70	0	0	to	75	0	0
Methyl acetone	ton	85	0	0	to	90	0	0
Alcohol, 1% acetone	ton	90	0	0	to	95	0	0
Nickel sulphate, single salt	ton	65	0	0	to	66	0	0
Nickel ammonium sulphate, double salt	ton	67	0	0	to	68	0	0
Potash, Caustic	ton	33	0	0	to	33	10	0
Potassium bichromate	lb.	0	0	7¾	to		—	
Carbonate, 90%	ton	31	0	0	to	33	0	0
Chloride 80%	ton	15	0	0	to	20	0	0
Chlorate	lb.	0	0	6	to	0	0	6½
Meta bisulphite, 50-52%	ton	120	0	0	to	125	0	0
Nitrate, refined	ton	45	0	0	to	47	0	0
Permanganate	lb.	0	0	11	to	0	1	0
Prussiate, red	lb.	0	2	4	to	0	2	6
Prussiate, yellow	lb.	0	1	2½	to	0	1	3
Sulphate, 90%	ton	20	0	0	to	22	0	0
Salammoniac, firsts	cwt.	3	5	0	to		—	
Seconds	cwt.	3	0	0	to		—	
Sodium acetate	ton	26	0	0	to	27	0	0
Arsenate, 45%	ton	45	0	0	to	48	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	6	to		—	
Bisulphite, 60-62%	ton	25	0	0	to	27	10	0
Chlorate	lb.	0	0	4½	to	0	0	4½
Caustic, 70%	ton	24	0	0	to	24	10	0
Caustic, 76%	ton	25	10	0	to	26	0	0
Hydrosulphite, powder, 85%	lb.	0	2	3	to	0	2	6
Hyposulphite, commercial	ton	15	0	0	to	16	0	0
Nitrite, 96-98%	ton	37	10	0	to	40	0	0
Phosphate, crystal	ton	23	10	0	to	25	10	0
Perborate	lb.	0	1	6	to	0	1	7
Prussiate	lb.	0	0	8½	to	0	0	9
Sulphide, crystals	ton	17	0	0	to	18	0	0
Sulphide, solid, 60-62%	ton	24	10	0	to	25	10	0
Sulphite, cryst	ton	15	0	0	to	16	0	0
Strontium carbonate	ton	80	0	0	to	85	10	0
Strontium Nitrate	ton	70	0	0	to	72	10	0
Strontium Sulphate, white	ton	7	10	0	to	8	10	0
Sulphur chloride	ton	41	0	0	to	42	0	0
Sulphur, Flowers	ton	13	0	0	to	14	0	0
Roll	ton	13	0	0	to	14	0	0
Tartar emetic	lb.	0	1	6	to	0	1	7
Tin perchloride, 33%	lb.	0	1	2	to	0	1	4
Tin perchloride, solid	lb.	0	1	5	to	0	1	7
Protochloride (tin crystals)	lb.	0	1	5	to	0	1	6
Zinc chloride, 102 Tw	ton	21	0	0	to	22	10	0
Chloride, solid, 96-98%	ton	50	0	0	to	55	0	0
Oxide, 99%	ton	36	0	0	to	37	0	0
Dust, 90%	ton	47	10	0	to	50	0	0
Sulphate	ton	21	10	0	to	22	10	0

Coal Tar Intermediates, &c.

	Per	£	s.	d.		£	s.	d.
Alphanaphthol, crude	lb.	0	3	0	to	0	3	3
Alphanaphthol, refined	lb.	0	3	6	to	0	3	9
Alphanaphthylamine	lb.	0	2	3	to	0	2	6
Aniline oil, drums extra	lb.	0	1	5	to	0	1	6
Aniline salts	lb.	0	1	6	to	0	1	7
Anthracene, 40-50%	unit	0	0	3½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	3	9	to	0	4	3
Benzidine, base	lb.	0	5	6	to	0	6	0
Benzidine, sulphate	lb.	0	5	6	to	0	6	0
Benzoic acid	lb.	0	2	0	to	0	2	3
Benzoate of soda	lb.	0	2	0	to	0	2	3
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate	lb.	0	5	9	to	0	6	0
Betanaphthol	lb.	0	2	0	to	0	2	2
Betanaphthylamine, technical	lb.	0	7	0	to	0	7	3
Croceine Acid, 100% basis	lb.	0	3	9	to	0	4	0
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	6	9	to	0	7	0
Dinitrobenzol	lb.	0	1	5	to	0	1	6
Dinitrochlorbenzol	lb.	0	1	4	to	0	1	5
Dinitronaphthaline	lb.	0	1	6	to	0	1	8
Dinitrotoluol	lb.	0	1	8	to	0	1	9
Dinitrophenol	lb.	0	2	9	to	0	3	0
Dimethylaniline	lb.	0	3	9	to	0	4	0
Diphenylamine	lb.	0	4	6	to	0	4	9
H-Acid	lb.	0	7	6	to	0	8	0
Metaphenylenediamine	lb.	0	5	6	to	0	5	9
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	6	6	to	0	7	0
Monosulphonic Acid (2.7)	lb.	0	7	0	to	0	7	6
Naphthionic acid, crude	lb.	0	4	0	to	0	4	3
Naphthionate of Soda	lb.	0	4	3	to	0	4	6
Naphthylamin-di-sulphonic-acid	lb.	0	4	9	to	0	5	0
Nitronaphthalene	lb.	0	1	4	to	0	1	5
Nitrotoluol	lb.	0	1	3	to	0	1	4
Orthoamidophenol, base	lb.	0	15	0	to	0	18	0
Orthodichlorbenzol	lb.	0	1	1	to	0	1	2
Orthotoluidine	lb.	0	2	3	to	0	2	6
Orthonitrotoluol	lb.	0	0	10	to	0	1	0
Para-amidophenol, base	lb.	0	11	0	to	0	11	6
Para-amidophenol, hydrochlor	lb.	0	11	6	to	0	12	0
Paradichlorbenzol	lb.	0	0	7	to	0	0	8
Paranitraniline	lb.	0	4	6	to	0	4	9
Paranitrophenol	lb.	0	2	9	to	0	3	0
Paranitrotoluol	lb.	0	5	9	to	0	6	0
Paraphenylenediamine, distilled	lb.	0	12	0	to	0	13	0
Paratoluidine	lb.	0	7	0	to	0	7	6
Phthalic anhydride	lb.	0	3	9	to	0	4	0
Resorcin, technical	lb.	0	5	6	to	0	6	0
Resorcin, pure	lb.	0	7	9	to	0	8	0
Salol	lb.	0	2	4	to	0	2	6
Sulphanilic acid, crude	lb.	0	1	4	to	0	1	6
Tolidine, base	lb.	0	6	6	to	0	7	0
Tolidine, mixture	lb.	0	2	6	to	0	2	9

French Potash

THERE has been no revision of the prices quoted for the grades of potash most in demand, but reports from various centres indicate that sulphate of potash is rather dearer. Stocks of potash bought last year have been disposed of and large buyers are now interested in obtaining fresh supplies at the prices now offering.

Patents Court Cases

APPLICATION has been made for the following patents to be indorsed "Licences of Right," under Section 24 of the Patents and Designs Acts, 1907 and 1919:—29,827/1913 relating to a process for producing sodium carbonate crystals; 19,245/1914 relating to apparatus for producing sodium carbonate. Both are in the name of M. Spazier. Any notice of opposition must be given by January 9, 1922.

Soviet Concession for U.S. Firm

ACCORDING to the late Soviet representative in the United States (Martens), a concession has been granted to an American chemical company for the exploitation for twenty years of asbestos deposits situated not far from Alapejevka, on the North Eastern Ural Railway. The company undertakes to instal modern equipment and to increase production to 2,600 tons within five years of operation. Fifty per cent. of the labour employed must be Russian, and the company has to deliver 10 per cent. of the annual output, or its market value, to the Soviet.

Company News

BRITISH OXYGEN CO., LTD.—The directors announce an interim dividend on the ordinary shares of 8d. per share, free of tax.

NEW TAMARUGAL NITRATE CO., LTD.—The seventh annual drawing of debentures will take place at 50, Lime Street, London, E.C. 3, on December 19, at 10.30 a.m.

EAST INDIA DISTILLERIES AND SUGAR FACTORIES.—The transfer books of the preference shares and the debenture stock will be closed from December 16 to 31 for the preparation of dividend and interest warrants.

EGYPTIAN SALT AND SODA CO.—The transfer books will be closed from December 16 to January 10 next. The twenty-first annual meeting will be held at the company's offices in Alexandria, Egypt, on December 23.

SALT UNION, LTD.—The transfer books for the mortgage debenture stocks will be closed from December 19 to 31, both days inclusive, for the preparation of the half-yearly interest warrants payable on January 2 next.

ANGLO-UNITED OILFIELDS, LTD.—It is announced that the applications for shares have substantially exceeded the minimum of 100,000 mentioned by the chairman at the recent meeting, and the first batch of letters of allotment were posted on Monday.

BORAX CONSOLIDATED, LTD.—The transfer books of the first mortgage debenture stock will be closed from December 19 to December 31, both days inclusive, for the preparation of the warrants for the half-yearly interest due on January 1, 1922. Coupon No. 45 of the debenture stock warrants to bearer will be paid, less income tax at 6s. in the £, on and after January 2, 1922, at the offices of the company, 16, Eastcheap, London, E.C. 3.

VAN DEN BERGHS, LTD.—Dealings in 125,000 ordinary shares of 5s. each, fully paid, Nos. 625,001 to 750,000, have been specially allowed by the Stock Exchange Committee under Rule 148a. These securities will rank *pari passu* with those in which special settling days have already been appointed, as soon as they are identical and the certificates are ready for distribution, and with those for which an official quotation has already been granted, as soon as they are identical and are officially quoted.

HUELVA COPPER AND SULPHUR MINES, LTD.—The transfer books are closed from December 6 to 13, both dates inclusive. The annual meeting will be held at 6, Old Jewry, London, E.C.2, on December 13, at 2.30 p.m. Holders of share warrants to bearer will be admitted to this meeting on presenting a certificate that they have deposited their warrants in accordance with the articles of association at least two days before the time of the meeting, at the company's offices, 6, Old Jewry, London, E.C.2, or 9, Boulevard de la Madeleine, Paris.

NIGER CO., LTD.—Notification has been sent to shareholders regarding special meetings for the consideration of a proposal to convert 3,000,000 of the unissued preference shares into 10 per cent. non-cumulative preference shares of £1 each, ranking below the rest of the 8 per cent. preference shares already issued both as to dividend and capital. The suggested conversion is in order to provide a class of shares for using as consideration to Lever Brothers, Ltd., for transfer by them of their various West African interests to the Niger Co.

AMELIA NITRATE CO.—The accounts for the year to June 30 last, including a balance of £52,176 brought in, show an available balance of £63,827. From this have to be deducted a preference dividend of £3,000, and a dividend on the ordinary shares of 7 per cent., less tax, leaving to be carried forward, £49,907. The falling off in profits is attributed to the fact that there has been so little demand for nitrate, no sales having been made for delivery after January last. The annual meeting will be held at River Plate House, Finsbury Circus, E.C., on December 12, at 12.30.

CASTNER-KELLNER ALKALI CO., LTD.—After making provision for liability for corporation profits tax, the net profit for the year, to September last, was £153,085, which, with £48,132 brought in, totalled £201,217. Payment of a further dividend of 5 per cent. (making 13 per cent. for the year, and payable on December 8) and the placing of £50,000 to depreciation reserve, leave to be carried forward £13,705. Last year the net profit was £283,853, the dividend 22 per cent., and £48,132 was carried forward. The annual meeting was held on Wednesday, at 7, Cavendish Square, London, W.

NOBEL INDUSTRIES, LTD.—A Stock Exchange notice states that the Stock Exchange Committee have allowed dealings in 128 deferred shares of £1 each, fully paid, Nos. 1,444,814 to 1,444,941; 3,628 ordinary shares of £1 each, fully paid, Nos. 7,952,173 to 7,954,945 and 7,996,074 to 7,996,928; and 4,651 preference shares of £1 each, fully paid, Nos. 5,992,435 to 5,993,191 and 6,078,887 to 6,082,780, have been specially allowed under Rule 148a. These securities will rank *pari passu* with those in which special settling days have already been appointed, as soon as they are identical and the certificates are ready for distribution, and with those for which an official quotation has already been granted, as soon as they are identical and are officially quoted.

BRITISH BURMAH PETROLEUM CO., LTD.—The company have been inviting applications for an issue of £600,000 8½ per cent. second mortgage debenture stock at 98 per cent. The stock is repayable at 105 per cent. on or before November 30, 1936. Each stockholder will have the right in any year up to November 1, 1936, to exchange his stock into ordinary shares on the basis of £1 of stock for one ordinary share of the nominal value of 8s. In respect of the year ending July 31, 1923, and during each succeeding year ending on July 31, up to 1936, £42,000, together with any arrears of such sum which the profits of any preceding year shall be insufficient to provide, is to be set aside and applied in redemption of the stock, by drawings at 105 or by purchase.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LOCALITY OF FIRM OR AGENT.	MATERIALS.	REF. NO.
Budapest	Mining plant and equipment.....	509
Zurich.	Refractory materials for smelting furnaces	512

Tariff Changes

TUNIS.—The prohibition on the export and re-export of bauxite is withdrawn as from October 24 last.

IRAQ.—A special excise tax (equivalent to the import surtax) of Re. 1 per gross boxes of sixty matches is imposed on all stocks of matches in Iraq which were imported before September 5 last.

AUSTRALIA.—In future the value of goods dutiable *ad valorem*, such as perfumery, &c. (on which drawback of excise duty is obtainable on the spirit content on export to Australia), is to be taken, for duty purposes, at the fair market value for home consumption in the country of export at the date of shipment (invoice) to Australia less the actual amount of excise duty paid thereon.

CANADA.—The Canadian Customs Authorities have decided that goods ordered before October 1, 1921, will not be subject to the additional duty of 10 per cent. leviable on goods not marked with the name of their country of origin, provided they are imported before July 1, 1922. Such goods, however, will not be released from the Customs before they are marked in conformity with the Canadian Marking Regulations at the expense of the importer.

PORTUGAL.—The following goods are, *inter alia*, exempt from the payment of import duty in gold: Camphor (refined), india-rubber, gutta-percha, ebonite and similar preparations, crude or prepared; sulphur; mineral oils, light and medium; quicksilver, metals, caustic alkalis, nitrate of silver, carbonates of potash and soda, salts of quinine, chlorhydrate, sulphate, tannate, valerianite, &c.; apparatus of copper for distilling and concentrating purposes *in vacuo*; manufactures of lead and copper (pure), brass, bronze and similar alloys; taps, spigots, valves, &c. Full particulars were published in the Board of Trade *Journal* (December 1, p. 584).

SWITZERLAND.—As from November 20 last, thermometers and pyrometers "*à aiguilles*" of graphite, manometers, hydrometers, vacuum gauges, and celluloid wares become subject to import licence requirement. These goods, however, may be imported over the Franco-Swiss and Italo-Swiss frontiers without licence.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

London Gazette

Companies Winding Up Voluntarily

MARTYN & CO. (WADEBRIDGE), LTD. G. Martyn, of Wadebridge, appointed liquidator.

THE METALLIC PAINT (MORETON'S PROCESS) CO., LTD. F. C. Williams, 92, Queen Street, Cardiff, auctioneer and accountant, appointed liquidator. Meeting of creditors at liquidator's office on Friday, December 9, 4 p.m.

Bill of Sale

[*The undermentioned information is from the Official Registry. It includes Bills of Sale registered under the Act of 1882 and under the Act of 1878. Both kinds require re-registration every five years. Up to the date the information was obtained it was registered as given below; but payment may have been made in some of the cases, although no notice had been entered on the Register.*]

WALDRON, Samuel Lydall, 64, Tudor Road, Leicester, dyer, December 1, £70.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, created after July 1, 1908, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges which would, if created after July 1, 1908, require registration. The following Mortgages and Charges have been so registered. In each case the total debt, as specified, in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced since such date.*]

BIGSBYS (MITCHAM), LTD., printing ink and varnish manufacturers.—Registered November 22, £2,000 debentures; general charge. *£750. March 30, 1921.

BURTON (W.) & SONS, LTD., Leicester, bleachers and dyers.—Registered November 22, £8,000 mortgage, to Leicester Temperance & General Permanent Building Society; charged on dyeworks and other buildings, &c., with fixed machinery and fixtures at Leicester. *£15,000. May 12, 1921.

CARMICHAEL SOAP & PERFUMERY CO., LTD., London, W.—Registered October 31, £2,100 debentures, to W. d'Ambrumenil, 110, Great Portland Street, W., director and secretary; general charge. *£1,000. January 1, 1921.

CROSBIE (W. M.) & CO., LTD., Laindon, dealers in drugs, &c.—Registered November 22, £500 debentures, to Sparks, White, & Co., Ltd., Tenter Street East, London; general charge. *Nil. April 30, 1920.

DAVIS (J. W.) & SON (HULL), LTD., paint and colour manufacturers.—Registered November 14, £3,000 debentures; general charge.

DURBIN & McBRYDE, LTD. (late DURBINS DRUG STORES (CROYDON), LTD.—Registered November 22, mortgage, to National Provincial & Union Bank of England, Ltd., securing all moneys due or to become due to the Bank; charged on 112, North End, Croydon. *Nil. January 12, 1921.

ELDERS WALKER & CO., LTD., Gateshead, paint manufacturers.—Registered November 14, mortgage, to National Provincial & Union Bank of England, Ltd., securing all moneys due or to become due to the Bank; charged on works at Lime Street, Ouseburn. *£812 12s. 6d.; Bank have a general charge by way of security for overdraft. May 27, 1921.

ELLIS (J. E.), LTD. (late DAISY, LTD.), Leeds, chemists, &c.—Registered November 18, £2,030 mortgage, to Leeds Provincial Building Society; charged on Woodbridge Mills, Horsforth. *£5,852. April 29, 1921.

MORTONS (CASH CHEMISTS), LTD., London, W.—Registered November 21, £20,000 debentures (filed under sect. 93 (3) of the Companies (Consolidation) Act, 1908), present issue £12,500; general charge. *Nil. December 28, 1920.

VICTORS, LTD., Manchester, chemical manufacturers.—Registered November 22, £30,000 debentures; general charge. *£3,500. March 7, 1921.

Satisfactions

DEARBORN, LTD., London, W.C., chemists.—Satisfaction registered November 22, £500, registered January 10, 1912.

DEGREASING CO., LTD., Dewsbury, extractors of oil, &c.—Satisfaction registered November 17, £4,000, registered January 28, 1915.

HEDLEY (THOMAS) & CO., LTD. (late THOMAS HEDLEY & CO. (1905), LTD., Newcastle-on-Tyne, soap makers, &c.—Satisfaction registered November 19, £3,000, part of amount registered October 10, 1913.

Receivership

NOBEL'S DRUG STORES, LTD. D. W. Bull, of 4, Churchill Road, Homerton, N., ceased to act as receiver or manager on September 18, 1921.

New Companies Registered

The following list has been prepared for us by Jordan & Sons, Ltd., company registration agents, 116 and 117, Chancery Lane, London, W.C.2:—

BARON PRODUCTS CO., LTD., 27, St. Thomas's Street, Portsmouth, Hants, manufacturers of perfumes, medicines, chemists' and druggists' sundries, &c. Nominal capital, £5,000 in 5,000 of £1 each.

BUCKLETON & NOURRY, LTD., 13, Rumford Street, Liverpool, manufacturers and dealers in rubber. Nominal capital, £500 in 500 shares of £1 each.

CARBURNA, LTD., manufacturers and dealers in all kinds of chemical substances for decarbonising cylinders and other parts of engines. Nominal capital, £1,500 in 1,500 shares of £1 each. A director: Dr. E. D. H. Hawke, Tolgulla, Shortlands, Kent.

Damages for Breach of Contract

In the Commercial Court of the King's Bench Division on Wednesday, Mr. Justice Greer had before him an action in which Thos. Rose & Partners, Ltd., of Hull, sued the Jeffree Transport Shipping and Trading Co., Ltd., of Cardiff, for damages for the non-acceptance of coal tar pitch. Mr. Dunlop, K.C., for the plaintiffs, said the defendants did not appear. The defendants agreed on August 6, 1920, to buy from the plaintiffs 2,000 tons of medium coal tar pitch on f.o.b. terms, shipment in the Thames, for export to France. The quantity was to be delivered by monthly instalments, from September to December inclusive. By mutual agreement the parties cancelled the first instalment upon the terms that the plaintiffs should allow the defendants 1s. per ton, and the plaintiffs had given credit for that amount. Defendants failed to take delivery of the remaining 1,500 tons. In November judgment was given against defendants in default of defence, and the plaintiffs were there that day for the purpose of assessing damages. The plaintiffs' claim was for the difference between the contract price and the price at which the goods were afterwards sold. Evidence having been given as to damages, his Lordship awarded the plaintiffs £10,635 with costs.

"Success"

Although Lord Beaverbrook, in his book on "Success" (Stanley Paul & Co., pp. 122, 2s. 6d.), does not, in so many words, give Pope's axiom, "The proper study of mankind is man," yet many of his remarks bear it out. In his preface the author addresses himself to the young man, but his remarks could well be read with profit by those who are past youth. Indeed, part of the work is rather above the heads of the very young, particularly perhaps the chapter on "Arrogance." In no sense does the author pretend to give one hundred hints on making money, but the book should prove a real stimulus to those who bewail the lack of education or of opportunity. Even if Lord Beaverbrook were unknown, it gives the impression that the views are those of a man who has tried, suffered reverses, and finally succeeded. The definition of "success" in the first chapter is interesting and refreshing.